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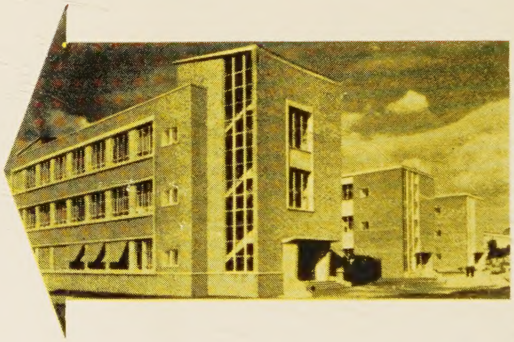

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NEW ZEALAND

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Magnolias, the subject of our cover this month, from a photograph by R. E. Wells, were grown by the Chinese and Japanese centuries before they reached Britain and in turn were brought to New Zealand by colonists. Actually the first magnolias to be introduced into Europe were American, but the Asian species, many collected only since the beginning of this century, have become the most popular. The magnolia was named in honour of Pierre Magnol (1638-1715), a director of the famous Montpellier botanical gardens in southern France.

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Ruakura's 12th Conference Parade of Science and Practice

THE outstanding success of the 12th Ruakura Farmers' Conference Week held at the Department of Agriculture's Ruakura Animal Research Station, Hamilton, in June belied misgivings expressed last year by the Station's Superintendent, Dr C. P. McMeekan, about the ability of Ruakura's staff to continue to supply subject matter and speakers enough to maintain the conference on the scale that farmers had apparently come to expect.

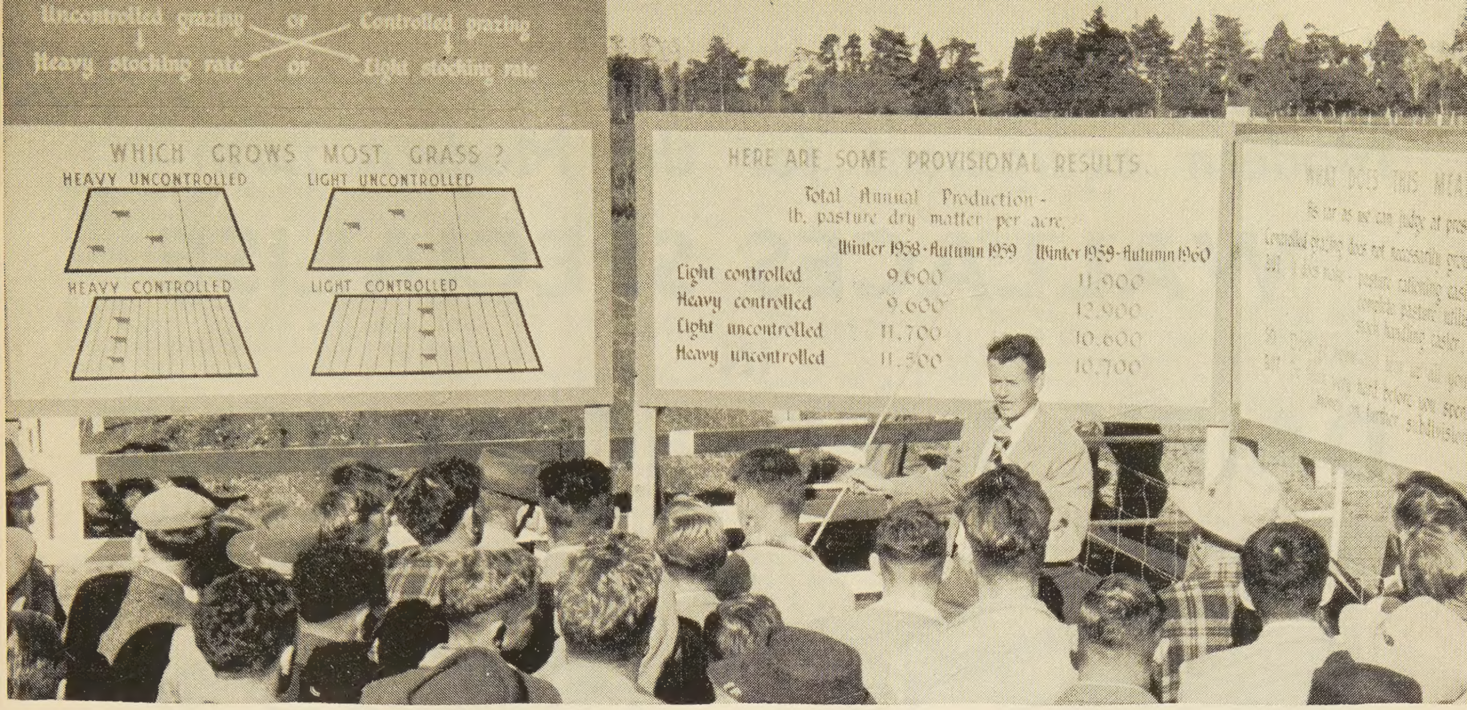
THOUGH one day of papers—those of general interest to all farmers—was deleted from this year's programme, the other two days of papers—for sheep farmers and dairy farmers—drew almost house-full audiences to the 1,000-capacity new conference hall, and the field day attracted about 5,000 visitors to see demonstrations at 13 points about the Station.

THE New Zealand Dairy Board's Artificial Breeding Centre at Newstead was included in the circuit of buses that serviced display points continuously throughout the field day, and for the first time at a conference, laboratory work in progress in the new laboratory block was open for inspection and discussion with research staff. Many sheepfarmers inspected projects at the Whatawhata Hill Country Station on the afternoon of the field day.

With two days of papers instead of three, Ruakura's own staff was able to supply at least as high a proportion of the panel of speakers as usual, in spite of continuation of the drain on staff deplored by Dr McMeekan last year. For the first time since the conference started in 1949 Dr McMeekan himself did not give a paper, though his chairmanship was the

At bottom—D. S. M. Phillips describing the practice of 30 sec. pre-milking stimulus that achieved a 32 per cent increase in production at No. 1 Dairy. Below—The food unit that got away might be the subject being debated at this laboratory demonstration of silage investigations by K. W. Loach and R. J. Lancaster.

SILAGE - ACID ANALYS
SILAGE
GRASS
WHAT
1. WA
BY A 30 SEC STIMULUS?


Uncontrolled grazing or Controlled grazing
Heavy stocking rate or Light stocking rate
WHICH GROWS MOST GRASS ?
HEAVY UNCONTROLLED
LIGHT UNCONTROLLED
HEAVY CONTROLLED
LIGHT CONTROLLED
HERE ARE SOME PROVISIONAL RESULTS.
Total Annual Production - lb. pasture dry matter per acre.
Winter 1958 - Autumn 1959
Winter 1959 - Autumn 1960
Light controlled 9,600 11,900
Heavy controlled 9,600 12,900
Light uncontrolled 11,700 10,600
Heavy uncontrolled 11,500 10,700

At No. 2 Dairy, where controlled and uncontrolled grazing at both high and low stocking rates have been compared over a number of years, A. G. Campbell discusses at one of several demonstration points on the four self-contained farmlets results being obtained from a recent change in the design of the experiments.

active role that has characterised all conferences.

Field day projects this year were of outstandingly practical application; many of the papers enlarged on themes treated in the displays; and interest was lent to the whole by the insight into the laboratory work of the "back room boys" who seek the reasons for and answers to the results of the Station's field experiments.

Field Day Demonstrations

1. Laboratory Block: *Research in the Laboratory.*

Farmers' Hall: *Controlling Worms in Sheep*—D. Cordes and G. Cairns.

2. Woolshed: *Wool Faults, Their Cause and Control*—J. H. Drake.

A back-board of wool samples showing faults, many of them collected locally and thus embarrassingly familiar to the hundreds of farmers who crowded the shed during the day, was the talking point for advice on how enlightened breeding, culling, and management can reduce the penalties farmers pay for poor production and preparation of their clips.

Sheepyards: *Age-marking Sheep*—G. Mackintosh, A. Carter, and A. W. Moore.

With the cooperation of the local branch of Federated Farmers a competition to assess the age of several pens of assorted sheep at this project lent the stimulus of a gamble to an experiment to determine the capacity of sheepmen to tell the ages of their flocks and to impress on them the importance of this factor in successful management.

Papers and Speakers

Research and the Farmer	J. F. Filmer
Nutrition of Grazing Sheep	L. R. Wallace
Fern Control	E. A. Clarke
Improving the Fertility of Two-tooth Romney Ewes	T. J. McClure
Hypomagnesaemia (Grass Staggers) in Beef Cattle	E. H. Shortridge
New Slants on:	
Selecting a Beef Bull	R. M. Gallagher
Shearing Weaned Lambs	L. R. Wallace
Vaccinating Sheep	J. C. Gerring
A Farming Tour of Europe (illustrated)	T. G. Tyrer
Progress and Problems in Artificial Breeding	J. P. James
Ideas on Marketing	H. H. Innes
Silage in New Zealand and Abroad	R. J. Lancaster
Progress and Problems in Tb Eradication	S. Jamieson
Milking Management	D. S. M. Phillips
What's Wrong with Your Production?	J. D. J. Scott

"Proceedings", which include all papers and discussions on them, may be ordered at 10s. per copy from Ruakura Animal Research Station, P.B., Hamilton, or from Publications Section, Department of Agriculture, Box 2298, Wellington, up to time of going to press in a month or so.

Cattleyards: *Growing More Beef*—R. M. Gallagher.

This project suggested that beef breeders, with meat production per acre in mind, should select their bulls on production characteristics; that is, on weight for age. Data from Ruakura work showed that a 170 lb weight difference between sires at 18 months meant a 20s. difference between their progeny sold as weaners, or 43s. difference if they were killed before their second winter. Other data showed differences in daily weight gain markedly in favour of the progeny of heavy sires as opposed to those of lighter sires.

3. Ewe Nutrition Block: *Effect of Live Weight at Mating on Reproductive Performance*—J. C. Percival.

Results were discussed of a trial to find how ewe performance is influenced by grazing management between weaning and flushing. Three similar groups of ewes were grazed so that one gained in condition, one just about maintained condition, and the third lost weight. After two months, and three weeks before tupping, the three groups were combined in a single flock. Those fed at a high level showed the highest ovulation rate, had the smallest proportion of dry ewes, and gave a considerably higher lambing percentage. "Are fat sheep more fertile?" is the answer being sought by continuation of the experiment.

A new tupping harness developed by C.S.I.R.O., Australia, and which will be available in New Zealand next season was demonstrated. Adjustable to all rams, its use allows ewes to be drafted according to lambing dates and dry ewes to be identified.

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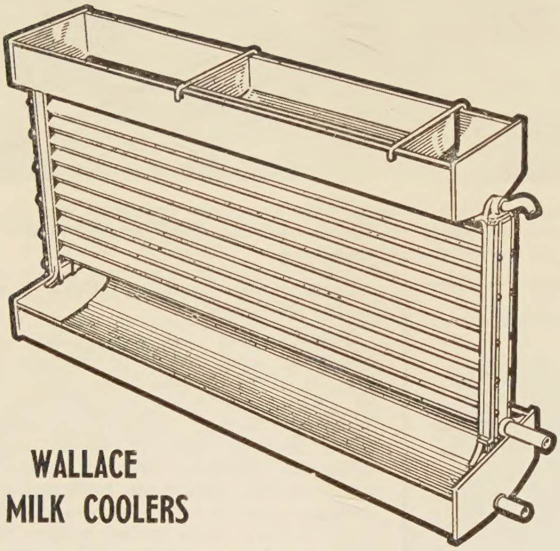

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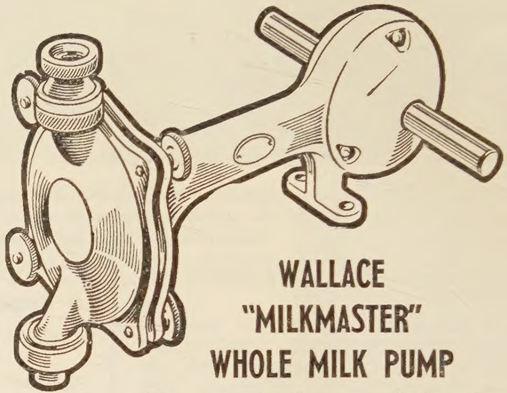

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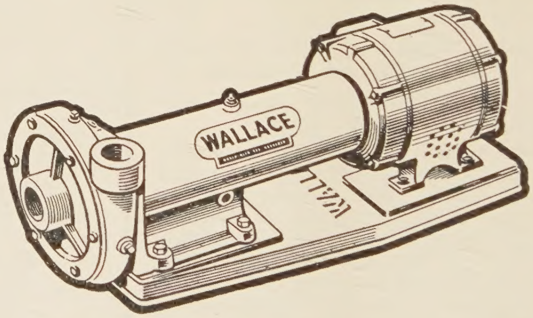

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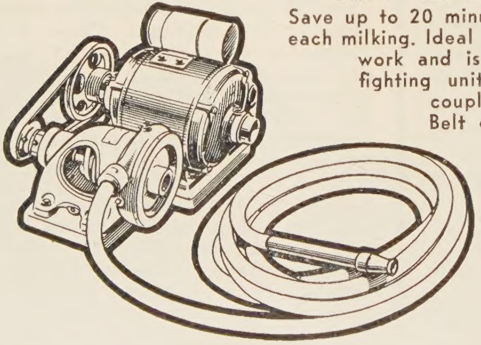

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4. Fat Lamb Area: *Effect of Time of Shearing on Returns from Wool and Lamb*—G. C. Everitt and J. Burns.

A flock of 600 Romney ewes mated to Southdown rams and divided into four groups were shorn respectively before lambing (in July), when the lambs were young (October), before weaning (November), and after drafting and weaning (December). Shearing before lambing and again after weaning gave better lambs away early, more and better wool, and easier management.

5. Mechanised Spot Spraying of Weeds—F. B. Thompson. **Machines for Digging and Cleaning Drains**—D. F. Scott.

A cooperative display, by advisory officers and firms, of mechanical aids to more efficient farming.

6. Self-fed Silage for Wintering Beef Cattle—Miss D. E. K. Walker.

Weight gains of two groups of 20 20-month steers, each being wintered on 15 acres, one with continuous access to self-fed silage and the other fed hay, are being studied. At this early stage of the trial there was a slight advantage in favour of the hay-fed group. The 100-ton stack with concrete strip alongside, and its operation under the new self-feeding system, attracted tremendous interest.

7. The Problem of the Dry Ewe—T. J. McClure.

Some of the results of experiments described in a paper to the conference by Mr McClure were discussed at this project, and the complexity of the problem of ewes failing to lamb was illustrated. Shearing two-tooth Romney ewes just before mating in the Waikato improves their fertility at first service and probably reduces the number of dry ewes.

Border Leicester Cross Sheep on Hill Country—E. A. Clarke.

Marked superiority of the half-bred (first cross) over the Romney in fertility, growth rate of lambs and hoggets, and wool production has been shown in studies of the effect of introducing a strain of Border Leicester into a hill country flock. The superiority is rapidly lost on breeding back to the Romney, and work on further trials concentrating on the fertility, general level of productivity, and variability of the interbred half-bred (half-bred ram x half-bred ewe) was described.

8. No. 1 Dairy: *Ruakura's Recommendations on Milking Technique*—D. S. M. Phillips.

Techniques and equipment developed at Ruakura for measuring a wide range of possibly relevant factors associated with the cow's milking behaviour were demonstrated and discussed. Experiments with a pre-milking hand stimulus of 30 seconds which increased production by 32 per cent or £10 10s. per cow were described at the dairy and in a paper by Mr Phillips.

Tributes to Dr J. F. Filmer, Retiring Director

THE conference opened on a sad note, said Dr McMeekan, in that the first paper was to be given by Dr J. F. Filmer, Director of the Animal Research Division, whose services were shortly to be lost through his retirement. "He was the architect of the Division and has been its leader since it was formed," said Dr McMeekan. "Though I personally usually come in for most of the credit showered on this Station, most of it is due to the staff and to the man who stands behind them. . . . He is to be congratulated on his leadership of animal research in this Dominion over the past 20 years. . . . Our hopes for his happy retirement are coupled with the wish that he should reappear from time to time from trout fishing at Taupo to tell us just what a mess we are making of our work".

Regret that progress with facial eczema research was not a little further toward solution of the problem, so that Dr Filmer could depart in something like the blaze of glory in which he arrived here in 1938 because of the important part he had taken in the discovery of the role of cobalt deficiency in animal disease, was expressed by Mr F. C. Johnstone, deputy chairman of the New Zealand Meat Producers Board, in conveying the best wishes of farmers to Dr Filmer. "Older farmers particularly will remember the facial eczema outbreak in 1938. . . . there were literally miles of carcasses. I had a farm carrying 1,160 sheep and didn't have 60 left. No one knew what to do. . . . Some people in this country, and I am going to plead guilty to being one of them, have been critical of Dr McMeekan and his lack of staff." Though a cure or real preventive had still to be found for facial eczema, said Mr Johnstone, tribute must be paid to all the good work done by Dr Filmer and his Division, not least to the conferences and field days at Ruakura that had been of such great benefit to large numbers of farmers over the years.

9. Piggery: *The Role of the Landrace; Feeding for Profitable Pig Production*—D. M. Smith.

This was the first farmers' field day at which recently imported Landrace pigs which have been made available for research at Ruakura have been on display, and they attracted great interest. Litters resulting from the introduction of the new strain into breeding experiments were studied and discussed.

Visual education reached a high peak in the management display, with effective combination of striking posters and four pens of pigs illustrating the theme of mating the sow in good condition; maintaining the weight of the lactating sow; giving the litter the best of everything, and adapting the ration of fattening pigs according to age and weight.

10. Newstead: *Dairy Board's Artificial Breeding Centre*—J. P. James.

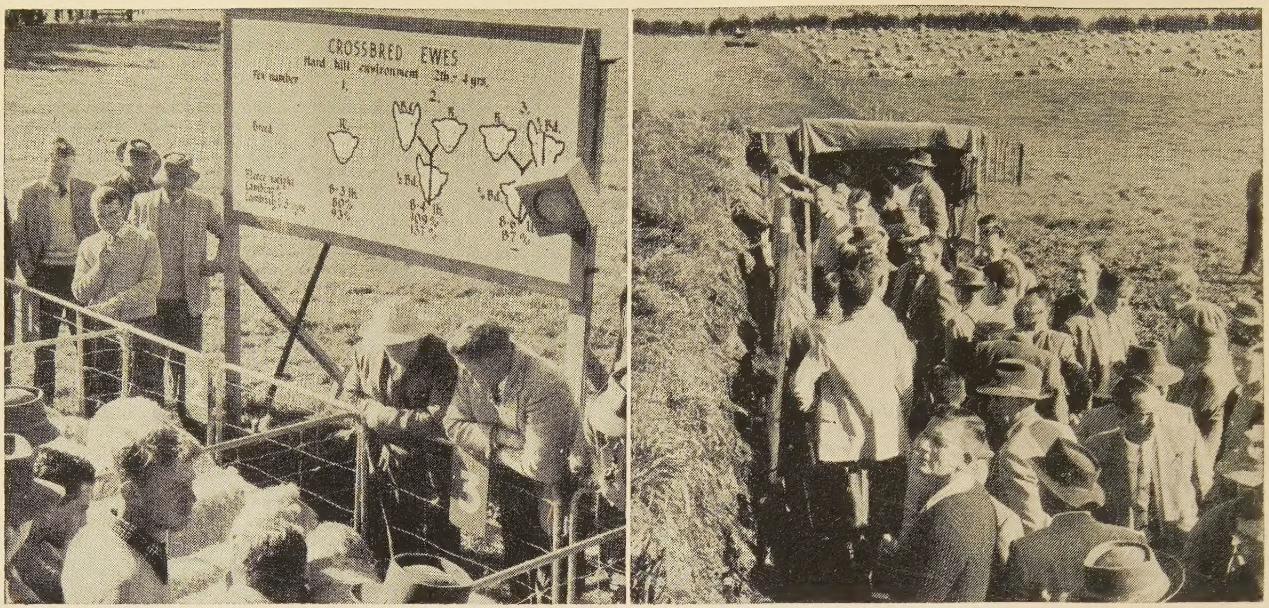
The extremely rapid and sustained growth in artificial breeding since the earliest commercial groups were started in 1949, when 1,600 cows were inseminated, to the past year, when 420,000 cows were artificially bred, was shown at the centre and described by Dr James in a paper. Bulls of the four dairy breeds and one beef breed from which service is now available were displayed at the centre, many of them in a new bull barn just being completed to house 40 bulls continuously for long periods.

11. No. 2 Dairy: *Effect of Stocking Rate and Grazing Management on Pasture and Animal Production*—D. Fielden, A. G. Campbell, and D. Clayton.

That great interest continues in the long-term work at this dairy, comparing controlled and uncontrolled grazing both at high and low stocking rates, was evident in the crowds that diverted from the bus route for the farm walk over the trial areas. Results for the three years since design of the experiment was changed suggest that controlled grazing becomes more important where high stock numbers are carried. It does not necessarily grow more grass, but it makes pasture rationing, complete utilisation of pasture, and stock handling easier and results in more butterfat per acre.

12. Abattoir: *Research on Hydatids*—A. D. M. G. Laing.

Organisation, administration, and operation of the National Hydatids Council's campaign against the disease were illustrated diagramatically, and diseased samples and equipment used at group dosings of dogs attracted widespread, and apparently appreciative, interest.



Left—The principles of sheep breeding experiments introducing a strain of Border Leicester into a hill country flock are discussed by G. D. Reed while farmers examine pens of the experimental sheep. Right—Self-feeding silage principles and methods under trial at Ruakura attracted great interest at several points during the field day. Here a 100-ton stack being used by Miss D. E. K. Walker for the wintering of beef cattle is being inspected.

13. No. 5 Dairy: L. R. Wallace, J. B. Hutton, O. F. Parker, J. W. Hughes.

Carrying Two Cows per Acre:

Three acres have been stocked with six milking cows to find how much butterfat can be produced and how much supplementary feed has to be fed when pastures are stocked high enough to ensure that all herbage grown is directly consumed. Hay is bought in when pasture is short. In the current season production declined rapidly after early December and all cows were dried off in late March. Average butterfat per cow and per acre was 232 lb and 464 lb respectively.

Two Different Systems of Wintering the Dairy Herd:

Two herds of 20 identical twins each run on 18 acres are being used to compare two systems: one of feeding silage liberally during good pasture growth in autumn so that enough pasture is saved for an all-grass diet from June; the other of feeding silage after mid June. The autumn-supplemented herd tends to outproduce the other slightly.

How Dairy Cows Use the Feed They Eat:

A milking cow set up in a metabolism stall and illustrating the equipment used and the results obtained in total input-output studies with lactating cows was a point of major interest; it showed the complexities of research that attempts to put a measure on factors that govern the success or otherwise of livestock husbandry.

14. No. 4 Dairy: *Self-feeding Silage*—R. Wise. *Vacuum Silage; Concrete Silo of Tilt-up Construction; Safer Feeding-out Trailers*—J. Doutre.

How some of the answers in the self-feeding silage method are being sought was shown in a trial where 60 cows have had continuous access for a month to a 100-ton stack and have been fed no grass. A silage alone maintenance ration for dry cows appears to be from 70 to 80 lb per day.

A pilot-scale method of making silage in vacuum compressed polythene bags was demonstrated; interest in silo making methods and feeding-out conveniences and labour savers evidenced the importance farmers are attaching to pasture conservation as an aid to efficient production.

Future of Conferences

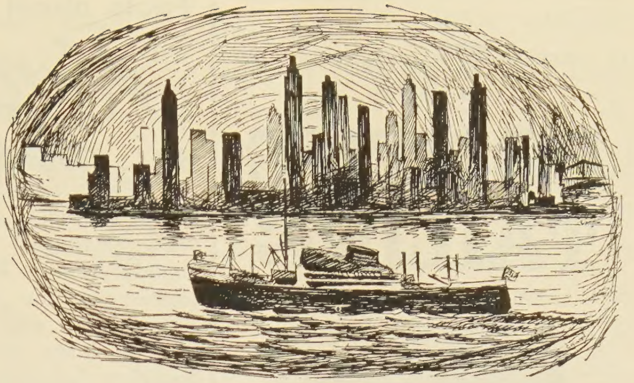
After 12 annual farmers' conferences at Ruakura it seems evident that the measure of support for them by farmers is no longer a gamble. A large proportion of regular attenders seem to rely on the conference as a necessary annual refresher course in the progress of agricultural science and practice. This year's programme was considerably influenced by suggestions from farmers as to its content, and there was whole-hearted support for its continuance annually along present lines when Dr McMeekan, toward the end of the conference, asked for suggestions regarding its future.

He declined emphatically a request that there be two field days instead of one, stating that "one and a half cars and five people per acre on Ruakura once a year is enough".

Ruakura Film "Good Shepherding"

RUAKURA'S reputation for successful compression, into the short compass of a movie film, of comprehensive coverage of findings affecting economic practice of some particular aspect of farm management is likely to be increased with the release of a new film "Good Shepherding" previewed on one night of the conference. Covering all aspects of flock management, the film, taken mainly on Ruakura by Station officers, deals particularly with before and after lambing care of the ewe and the treatment of complicated presentations. The economic losses due to mismanagement and unskilled shepherding are stressed; and ways and means provided by Ruakura research to prevent them are illustrated. What must be at least rare, if not unique, photography of complicated lambings and treatment of attendant troubles, with a ewe skeleton and "dummy" lamb to illustrate the techniques of assistance that save losses of ewes and lambs, distinguishes the film as a first-class farmer educational documentary. After final editing and addition of the sound track, copies of the film will be available for showing to farmer audiences by extension officers of the Department.

Livestock Numbers and Production in U.S.A. are of Interest to N.Z.



By J. B. QUIGG,
Investigating Officer, Department of Agriculture, Wellington

THE U.S.A. is an important market for New Zealand's exports and in 1958 purchased from us goods to the value of £36.4 million. The most important individual exports were livestock products (meat £21.5 million, wool £8.8 million, hides and skins £2.8 million, and casein £1 million). The latest available statistics, which cover the first nine months of 1959, show that our exports to the U.S.A. have been well maintained, the total being valued at £36.8 million, of which meat amounts to £15.7 million, wool £13 million, hides and skins £4.9 million, and casein £1.3 million. Because of the place at present occupied by the U.S.A. as a market for our livestock exports and of the need for New Zealand to expand overseas markets it is of more than passing interest to note the course of agricultural production in the U.S.A. This article discusses briefly present livestock and poultry numbers in the U.S.A. and projections recently made by the U.S. Department of Agriculture of production and prices of farm products for 1960-65.

THE U.S.A. is largely self-sufficient in meat production, but as livestock numbers fluctuate the import demand for the steadily growing population varies from year to year. Table 1 gives the number of livestock and poultry on farms and ranches in the U.S.A. during the past decade.

TABLE 1—LIVESTOCK AND POULTRY IN U.S.A.
(Million head at 1 January)

	1949-58 (Average)	1958	1959	1960
Cattle ..	89.6	93.4	96.7	101.5
Cows 2 years and over for milk* ..	23.4	22.2	21.5	21.3
Hogs	54.5	51.0	56.9	58.5
All sheep ..	31.2	31.3	32.9	33.6
Stock sheep† ..	27.1	27.3	28.5	29.5
Horses and mules ..	5.5	3.4	3.1	3.1
Chickens ..	407.4	370.9	383.5	366.9
Turkeys ..	5.2	5.5	5.9	5.7

* Included in cattle

† Included in all sheep

(Source: United States Department of Agriculture)

The number of cattle at 1 January 1960 was a new peak, being 5 per cent higher than the previous record (at 1 January 1956). This upward movement in numbers is a good illustration of what is known in the U.S.A. as the cattle cycle, or the tendency of cattle numbers to follow a cyclical pattern of peaks and troughs. The build-up period in the present cycle began in 1958 as shown in the table. The effect was to reduce production of meat in the U.S.A. and increase the demand for imports of both live cattle and meat. New Zealand has supplied a substantial share of the imports of meat. Table 2 gives our exports during the past three seasons.

TABLE 2—EXPORTS OF MEAT TO U.S.A.
(Tons)

	1956-57	1957-58	1958-59*
Mutton and lamb	511	3,544	5,742
Quarter beef ..	842	9,720	9,958
Boneless beef and veal	18,838	69,420	63,085
Pig meat ..	1	4	10
Offal	110	259	186
Totals ..	20,302	82,947	78,981

* Provisional
(Source: New Zealand Meat Producers Board)

Both livestock production and slaughter in the U.S.A. are expected to increase in 1960, but imports of live animals and meat should remain large, though not as large as in 1959, when imports amounted to about 9 per cent of total meat supplies (the U.S.A. consumes at present about 12.3 million tons of meat a year).

Milk cows and heifers two years and over have declined in number continuously since 1945 and the total at 1 January 1960 was the lowest since 1917. Despite this, the production of milk per cow has increased at a rate which in most years has been more than sufficient to offset the reduction in numbers of milk cows. Dairy farmers in the U.S.A. are paid high support prices for their products and production exceeds demand at these prices. Imports of dairy produce are therefore strictly controlled and New Zealand exports in recent years, apart from casein, have not been large.

Sheep numbers at 1 January 1960 were the highest since 1948, but well below the pre-war and wartime levels of 50 to 57 million. The increase in numbers has, however, been sufficient to give rise to some concern among American farmers that the present level of imports of live sheep and mutton and lamb is likely to cause injury to domestic producers. The U.S.A. producers therefore successfully requested the United States Tariff Commission to institute an inquiry into rates of customs duty on sheep and lambs and sheep and lamb meats. This inquiry was held in March, but at time of going to press the findings of the Commission had not been promulgated.

Projections for 1960-65

Early this year the United States Department of Agriculture published a report which gave projections of production and prices for major farm products for 1960-65. The projections assumed conditions in the U.S.A. approximating to a much greater extent free production and marketing of agricultural commodities than in fact prevail at present.

The projections showed that total farm output in 1965 would be 37 per cent higher than the 1947-49 average and 20 per cent above the level achieved in 1955-57. The increase would be greater for livestock than for crops, the comparative figures above 1955-57 output being 25 per cent and 16 per cent respectively.

Production was expected to increase faster than population, which should amount to 195.7 million in 1965, an increase of 16 per cent from 1955-57, but not as fast as per capita disposable income. The latter was expected to reach 2,120 dollars in 1965, a 22 per cent increase above that for 1955-57.

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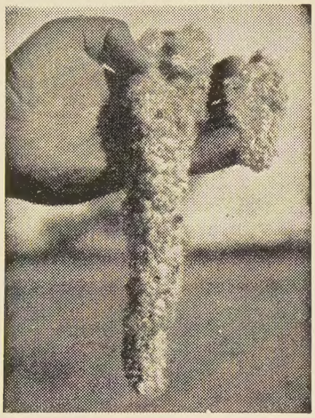

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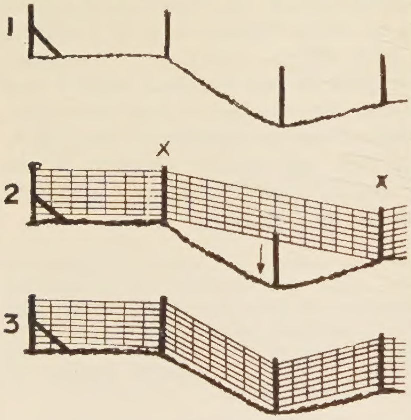

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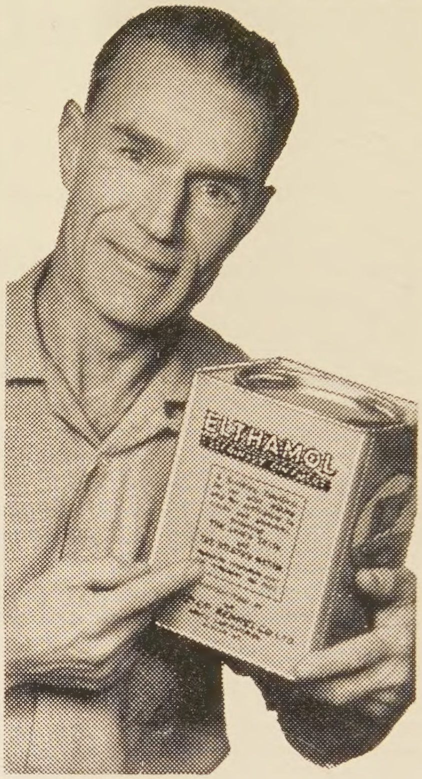

that special attention to cows teats and udders will produce better results.

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The projected increase in farm output would imply a per capita food consumption in 1965 about 5 per cent higher than in 1955-57. Greater meat consumption would account entirely for the increase.

From the point of view of the farmer himself the projections show that in 1965 prices would, on average, be 17 per cent below those of 1955-57. The fall in prices for crops would be greater than the fall in the prices for livestock and livestock products. The overall effect of increased production but reduced prices would be that in 1965 farmers' total cash receipts would be only 2 per cent higher than in 1955-57.

In view of what was said earlier about the cattle cycle it is interesting to record that the projections expect the cyclical expansion in cattle production to reach a peak of 113 million head in 1964 (present (1960) level 101.5 million). Live-weight production of beef and veal is projected to reach 15 million tons by 1965, 26 per cent greater than in 1955-57. Per capita consumption of beef and veal would reach 103 lb by 1965, about 10 per cent higher than in 1955-57, and prices received by farmers for cattle would gradually decline from about 20 dollars per 100 lb in 1960 to 15 dollars in 1965. This latter figure would be 6 per cent below the 1955-57 average.

Sheep and lamb production was projected to increase approximately in line with the estimated increase in population. In contrast with the projected increases in the per capita consumption of beef and veal and of pork, no increase is expected in mutton and lamb and in consequence a small downward adjustment in prices is projected.

The other class of products dealt with in the projections that is of particular interest to New Zealand is dairy products. Milk production is projected to increase gradually during the period to a level of 140 million lb by 1965. This would be 12 per cent above 1955-57. On the other hand, per capita consumption of total milk in 1965 is expected to be less than 1 per cent above that for 1955-57. In the absence of support prices, prices received for milk wholesale are expected to be 13 per cent below 1955-57, but, owing to a number of factors, the price for butterfat is expected to increase by 8 per cent.

The United States Department of Agriculture has stressed that these are projections of the probable situation under specific assumptions and are not forecasts. Some of the assumptions made were that upward trends in population, productivity, and real income per capita will continue, that retail prices and prices paid by farmers will not rise significantly above current levels, that there will be no major changes in the international situation, and that average weather will prevail.

Likely Impact on New Zealand

The U.S.A. is a country with a large population and the highest standard of living in the world. She is at present an important market for New Zealand meat and wool and, in the absence of trade restrictions, would undoubtedly be a substantial buyer of our butter and cheese. The U.S.A. must therefore be considered one of New Zealand's main existing markets and a potential market of great significance.

It would seem from the projections, however, that agricultural output in the U.S.A. is likely to outrun demand and that increased production will be disposed of only by suppliers' accepting a reduction in prices. Price falls are likely to be smaller for livestock products than for crops and smaller for meat than for milk.

The projections make no reference to imports; in fact for certain commodities (for example, feed grains, wheat, rice, cotton, soya beans, and tobacco), substantial increases in the existing high levels of exports are projected. It must not be concluded, however, that the prospects for exporting countries such as New Zealand are completely discouraging. In a country such as the U.S.A., with its very high level of national income, there is always scope for increased consumption. An important determinant of the level of consumption of any particular product will always be its price, both in an absolute sense and in relation to the prices of competing products.

Table 3 shows the per capita consumption levels for some major food commodities in the U.S.A. (1958 and projected 1965) compared with New Zealand (1958). The table also gives a number of comparative figures for other commodities in the years 1954-56.

TABLE 3—PER CAPITA CONSUMPTION OF FOODSTUFFS IN U.S.A. AND NEW ZEALAND

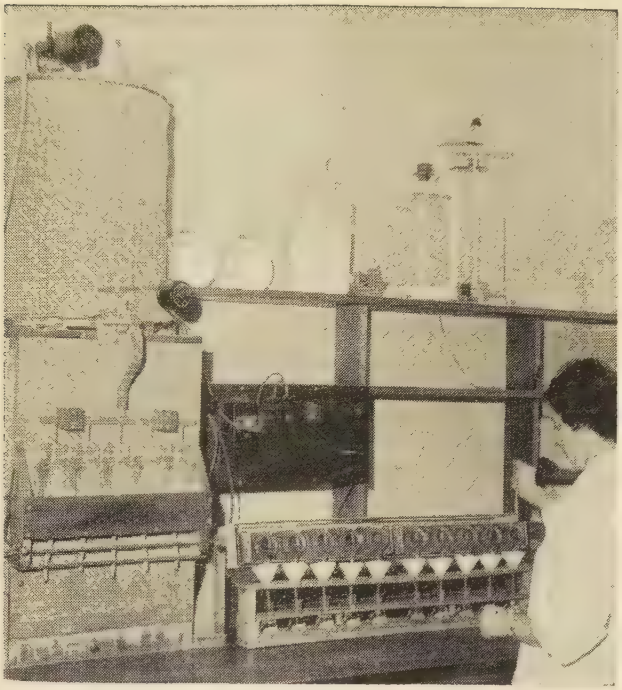
Commodity	U.S.A. 1958	U.S.A. 1965	N.Z. 1958
lb			
Beef and veal ..	87.2	103.0	113.2
Pork	60.7	75.0	30.3
Lamb and mutton ..	4.1	4.4	76.3
Total red meat ..	152.0	182.4	219.8
Poultry	34.1	36.9	3.5
Eggs (number) ..	349	353	274
Dairy products (total milk equivalent) ..	692	704	1,325
	Average 1954-56		Average 1954-56
Wheat	126.1		178.2
Potatoes	96.4		103.8
Sugar (refined)	89.5		94.4
Butter	8.8		44.4
Margarine	8.4		4.0
Cheese	12.5		5.9

(Sources: Report by the United States Department of Agriculture on Farm Price and Income Projections 1960-65, FAO Food Balance Sheets, and Department of Statistics)

The figures in the table show that on the basis of New Zealand standards there is still room for an expansion in consumption in the U.S.A. With a population approaching 200 million, a relatively small increase in annual per head consumption can mean a substantial additional demand for a product. For instance, an increase of 1 lb per head in lamb consumption is the equivalent of an additional annual requirement of about 90,000 tons, or more than one-third of New Zealand's total annual lamb exports. With butter, 90,000 tons is more than half our annual exports in recent years.

New Zealand is the lowest cost producer of livestock products in the world. We can be confident that in the years ahead we would be able to sell meat and dairy produce in the American market at prices which would be sufficiently attractive to consumers to encourage an increasing per capita level of consumption. The major problem confronting us is likely to be one of access to that market. At present we have access for meat, but the market for dairy products is very restricted.

Political problems are involved in this vital issue of access to the U.S.A. market. New Zealand has lost no opportunity in various international forums of stressing that it is of the utmost importance that a country such as the U.S.A., which occupies such a significant place in world trade, should move toward a more liberal policy in trade in agricultural products. For our part we must maintain and, where possible, improve the high quality standards which we have adopted to meet the demands of the American consumer.



ROUND THE RESEARCH STATIONS

Current Work and Findings in Department of Agriculture and Department of Scientific and Industrial Research Trials and Experiments

Rukuhia

Lucerne in the Waikato

As part of the spray irrigation research programme being carried out at Rukuhia Soil Research Station the response to irrigation of various farm crops is being studied. Most recent crop to come under trial has been lucerne, a stand of which was sown in the spring of 1958 on an area of Horotiu sandy loam of low fertility. Establishment was good and measurements began in September 1959.

The irrigation treatments applied were:

(1) No irrigation, (2) irrigation at 4 in. deficit (normally two to three waterings of 4 in. per season), and (3) irrigation at 2 in. deficit (five to six applications of 2 in. per season).

As rainfall was well distributed, responses to irrigation in the first season have been slight.

Four different fertiliser treatments were applied to irrigated and non-irrigated plots. All plots received an initial basal dressing of 10 cwt of lime and 20 lb of borax per acre and receive annually 5 cwt of superphosphate and 2 cwt of muriate of potash. The fertiliser treatments applied over and above this are (1) no additional fertiliser, (2) 5 cwt per acre of superphosphate, (3) 2 cwt of muriate of potash, and (4) 5 cwt of superphosphate plus 2 cwt of muriate of potash.

Overall yields have been good, 20 tons of green material being harvested in four cuts between September and the end of February.

Important responses have been obtained from additional potash, but the extra phosphate has had little effect yet.

When yield data are available over a number of years, the information should be of value to Waikato farmers wishing to assess the merits of this crop for their particular use.

Wallaceville

Cage Paralysis

Over the last few years a condition known as cage layer fatigue or cage paralysis has been seen in birds kept in laying batteries. It is indicated by a leg weakness and occasionally fractures of leg and wing bones. It affects birds after a heavy laying season and seems to be most pronounced during hot weather.

Bones are exceedingly brittle as the result of a depletion of the mineral content of the shaft. Egg shell quality is not impaired. Birds will recover within four to seven days of removal from the cages and being return to the floor.

This condition has been experienced in the U.S.A. under similar conditions and it was observed there that it affected mainly birds that had been reared on range before going into the cages rather than those which had been raised on wire and had become adjusted to wire floors.

Poultry farmers would be well advised to pay attention to the mineral requirements of birds kept under these conditions.

Grasslands Division

Longevity of Seeds

Mention is often made of the longevity of the "hard" seeds of legumes such as our pasture clovers or of the seeds of such persistent weeds as docks. In such plants viability is often retained for 20 years or more, germination occurring when cultivation brings the seeds closer to the surface, where temperature, moisture, oxygen supply, and other factors are favourable.

The same interest does not appear generally to have been taken in the grasses. The widespread distribution of *Poa annua* plants, for example, suggests that perhaps the seed persists in the soil. Recent work at Grasslands Division on the rate of emergence and the period over which germination takes place, involving 26 species of grasses, indicates that there is a wide range in period of dormancy and seedling emergence.

In some, such as barley grass (*Hordeum murinum*), emergence reaches its maximum in three to four weeks. In others, such as crab grass (*Digitaria sanguinalis*), germination may not occur for some weeks or even months and percentage of germination varies with the species.

Fresh crops may appear in successive spring and autumn seasons for several years from the same seed. Those grasses which possess this capacity may, if they are useful pasture species, be of advantage in colonising open spaces in a pasture bared by drought or other cause. On the other hand, if they are of little agricultural value or definitely undesirable, they may perpetuate a weed problem in the same way as goosegrass, hairgrass (*Vulpia*), and *Poa annua* have.

Ruakura

All Year Round Beef Production

Our extensive market for fat lamb meat owes much to the fact that this commodity is available on the British market every week in the year. In contrast the supply of New Zealand chilled beef is highly seasonal and in consequence is at serious disadvantage when competing with much more regular supplies from the Argentine.

Trials are under way at the Ruakura Animal Research Station to investigate the practicability of producing first-class chiller-type beef all the year round. For this purpose three techniques are being exploited:

1. The mating of some herds to calve in autumn instead of in spring. Local farmers are cooperating in the supply of both spring and autumn born weaner steers.
2. Maximum use of autumn-saved pasture as is at present widely practised on dairy farms.
3. Self-fed silage for winter feed to be used as a supplement to high-quality autumn-saved pasture.

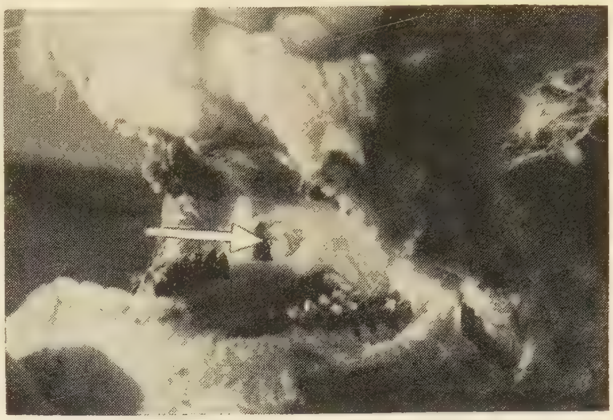
The cattle are being farmed in conjunction with a normal complement of ewes and lambs.

Wallaceville

Mortality in Lambs after Drenching Gun Injury

A recent mortality in lambs after drenching was shown to be due to infection entering a wound made in the throat by the nozzle of the drenching gun.

The gun used was a single-dose type with a very long nozzle and the injury to the throat is shown in the accompanying illustration (indicated by arrow).



All affected sheep had injuries to the right side of the throat, suggesting that the operator was left handed and this was confirmed. Large abscesses formed on the right side of the throat and some extended down the neck almost to the brisket.

As this mortality involved stud ram lambs, it proved very costly to the owner. Improved types of drenching guns which are much safer to use can now be bought, and the oesophageal type is not only safe but has the added advantage of causing less wool staining.

Invermay

Effect of Cover Crops on Pasture Establishment

During the past three years a series of trials has been laid down to investigate the effect of rape and cereal cover crops on the establishment of new pasture. These trials have included a light (½ lb) and heavy (2 lb) seeding rate of rape and have been sown on high fertility alluvial soil and on less fertile hill soils.

Results have shown that the inclusion of rape is inadvisable under high fertility conditions, but that a light seeding is unlikely to prove harmful on low fertility soils. Forage cereals such as barley and ryecorn which are grazed off within a few weeks of sowing are unlikely to prove very harmful and are preferable to rape under high fertility conditions. Cereals such as wheat and oats sown during early spring and harvested for grain cannot be recommended, as the undersown pasture may be almost entirely choked out by the more vigorously growing cover crop.

◆

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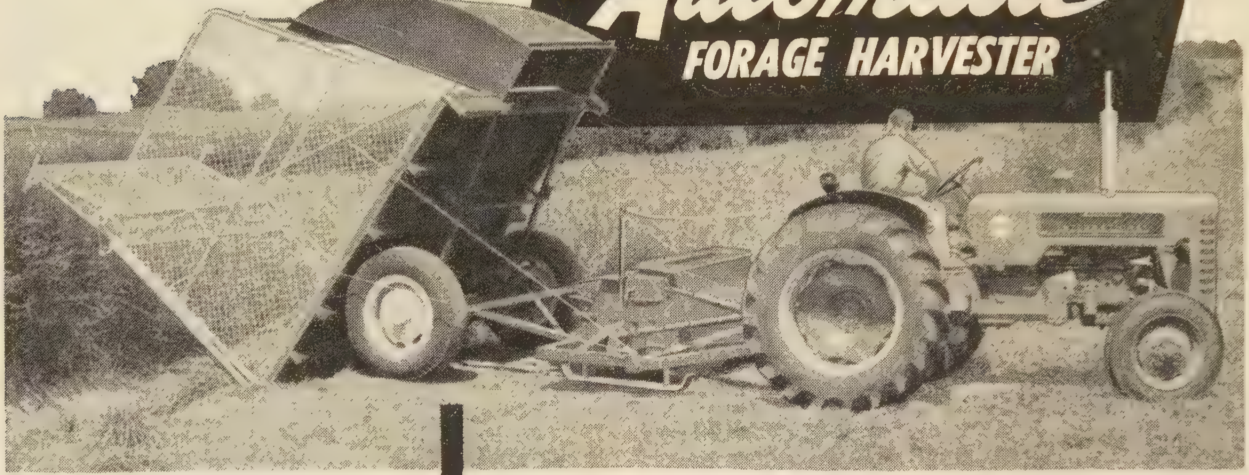

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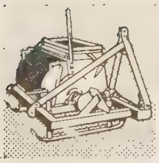
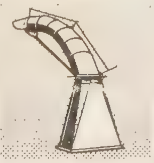
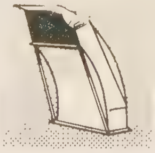


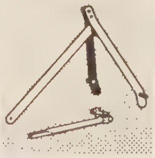
Cutting Unit (as used in Automatic)



Swivel Chute (360° operation)



Fixed Chute



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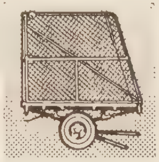

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Changes in Department's Senior Staff

Mr D. W. Caldwell Appointed Chief Advisory Officer (Animal Health)

MR D. W. CALDWELL, formerly Livestock Superintendent in the Department of Agriculture at Auckland, has been appointed to a new position of Chief Advisory Officer (Animal Health) in the Department and will be stationed in Wellington.

Mr Caldwell is 45 years of age. He qualified at Edinburgh as a Member of the Royal College of Veterinary Surgeons in 1937. After veterinary service in the Second World War and private practice in Great Britain, Mr Caldwell came to New Zealand in 1950 to take up an appointment as Veterinarian in the Department of Agriculture at Hamilton. In 1958 he was appointed Livestock Superintendent at Auckland, where he was in charge of the Department's veterinary services in the northern half of the North Island.

Mr Caldwell.

In 1954 Mr Caldwell visited Western Samoa to investigate tuberculosis in cattle there. He was a member of New Zealand's delegation to the 8th International Grassland Congress at Reading, England, in July.

As Chief Advisory Officer (Animal Health), Mr Caldwell will have charge of the Department's programme for the improvement of animal health and of efforts to control infectious diseases of livestock other than bovine tuberculosis and will supervise the Department's precautions against the introduction of animal diseases from overseas.

Mr Caldwell's new appointment has been necessary principally to enable Dr S. Jamieson, who has been Chief Advisory Officer (Infectious Diseases Control) to cope with the rapid expansion of the schemes for eradicating Tb from town supply and factory supply dairy herds. These have grown into the Department's major disease-control activity and now embrace some 60,000 dairy herds comprising about 3,000,000 animals, which are being tested by 225 veterinarians.

The technical and administrative work of supervising testing and the coordination and progress of the schemes will be undertaken by Dr Jamieson as Chief Advisory Officer (Tuberculosis Control).

Appointed Assistant Fields Superintendent at Dunedin

MR G. L. BANFIELD, Farm Advisory Officer, Department of Agriculture, Thames, has been promoted to Assistant Fields Superintendent in the Department at Dunedin. He succeeds Mr A. Stuart, who has been appointed Fields Superintendent at Palmerston North.

Mr Banfield is 42 years old. He has a B.Agr.Sc. degree and joined the Department in 1946 as an Instructor in Agriculture at Hamilton after five years' service in the R.N.Z.N.V.R. Mr Banfield transferred to Thames in 1947.

Apart from his general advisory work in the Thames district, Mr Banfield has made an important contribution to the solving of weed control problems in the Hauraki Plains, particularly in wet pastures and in drainage systems. He has also done important work on hill country improvement on the Coromandel Peninsula.

[Sabrina Studios

Mr Banfield.

Retired after 35 Years' Service to Government and Fruitgrowing Industry

MR A. R. GRAINGER, Horticultural Superintendent in the Department of Agriculture at Christchurch, retired at the end of June after 35 years' service to the Government and the New Zealand fruitgrowing industry. For the past five years he had been in charge of all the Department's horticultural advisory and inspection work in Canterbury and Otago.

Mr Grainger joined the Department of Agriculture in 1926 as an Assistant Orchard Instructor at Hastings after service in the First World War and a period as a private orchardist. In 1934 he was promoted to Orchard Instructor at Tauranga and while he was there the dreaded citrus canker was discovered in citrus orchards in the district. Tracking down the infection and eradicating it were major tasks for Mr Grainger and the Department.

[Green and Hahn

Mr Grainger.

After periods at Mapua and Christchurch, Mr Grainger was appointed Fruit Standardisation Officer in the Department's head office in Wellington in 1947. His work was concerned with the overhauling and bringing up to date of the numerous regulations and grading standards which covered the horticultural industry. Mr Grainger became responsible for maintaining a nationwide uniform standard of grading for fruit for export. Mr Grainger was promoted to Horticultural Superintendent at Christchurch in 1956.

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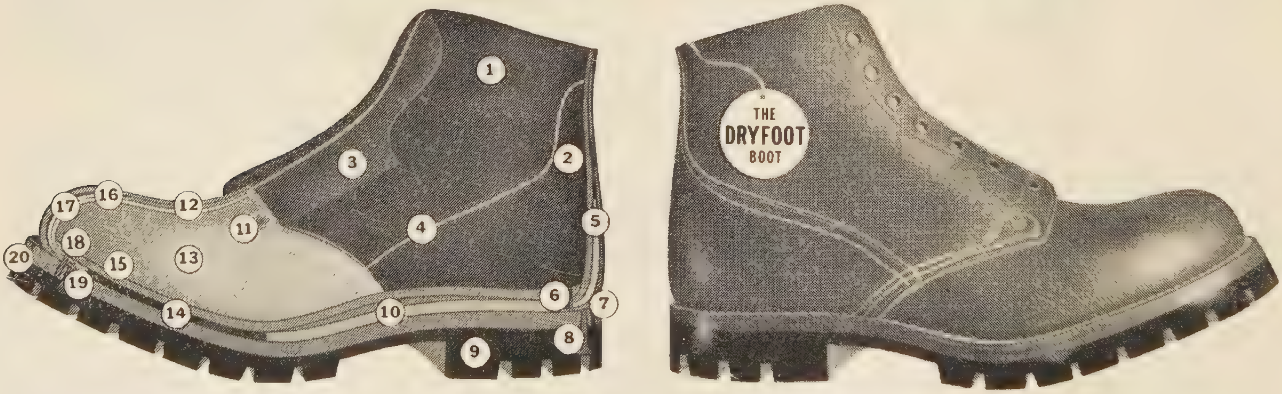

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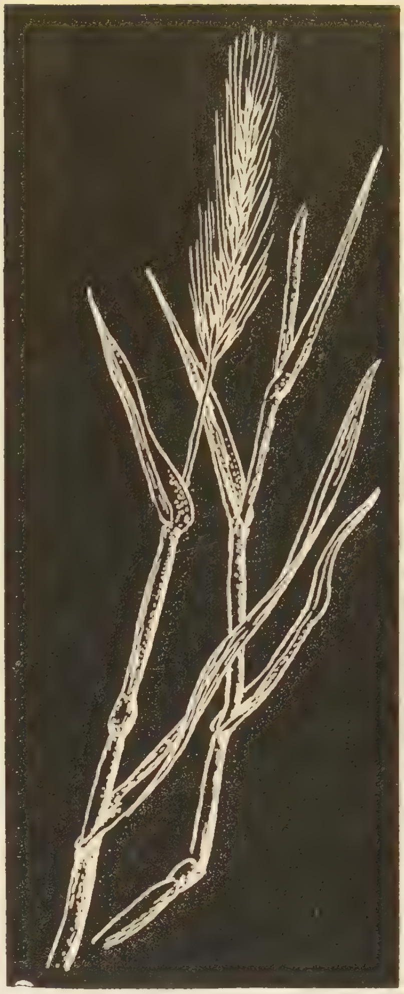
Control of Barley Grass

By D. M. E. MERRY,
Farm Advisory Officer, Department of Agriculture, Pukekohe

BARLEY grass (*Hordeum murinum*) can be controlled; where conditions are suitable it can be very nearly eliminated in one season. The time to plan the attack is late winter (before spring growth begins).



FROM the considerable experimental research and, more recently, paddock-scale trials two very significant points have emerged:

1. Little if any barley grass seed remains viable in the ground for more than one season. Thus if reseeding can be prevented in any one year, few if any plants will appear the next year.
2. Early spring (just before the seasonal flush of growth begins) is the right time to spray. A follow-up or "chaser" spray is imperative about six weeks after to catch any seedlings not killed with the first spraying and which have germinated late.

Complete control of barley grass involves meticulous care in spraying, doing the job only at the right time, and having the pasture **close grazed**. This final condition is needed so that the weedicide is able to coat and kill all young barley grass seedlings and spray reaching the soil washes in for its secondary killing action through the roots.

As a practical extension of plot trials two paddocks in the Pukekohe instructorate heavily infested with barley grass were each sprayed twice with dalapon in the past season. One was on a sheep farm, the other on a dairy property. On the sheep unit mob stocking bared the pasture evenly and closely before treatment. The dairy pasture was also closely eaten out, but because of more selective grazing and rank patches left, it was decided to bare the sward evenly with a rotary mower.

Both pastures were sprayed in early September with 2 lb of dalapon per acre mixed in 30 gallons of water. Spray was applied through a boom fitted with 46F nozzles at 30 lb per square inch. Spraying speed was 3 m.p.h. Along fencelines and under trees a hand-pressure gun, supplied from a tractor-mounted 44-gallon drum in which 2½ lb of dalapon had been mixed, was used.

A commercial spreader was added to the spray in all treatments and a sticking agent in some. Marker dye was also tried. The second or follow-up spraying was done in a similar manner six weeks later, again after pasture regrowth had been well eaten down, using 1½ lb of dalapon per acre. The original treatment under the trees was also repeated.

Results

Barley grass has been almost wholly eliminated on the sheep-grazed paddock, including very dense growth beneath trees which were camping spots.

On the dairy farm control, though highly satisfactory, was not as complete. It had been impossible to spread the cow manure effectively in spring and it sheltered barley grass seedlings from the spray. Grazing before spraying was also not as close on a mixed-species pasture containing a lot of cocksfoot as on a ryegrass-white clover sward. A cut of silage was taken and some hand pulling was done on the dairy pasture in an endeavour to free it completely of barley grass. A retreatment on the above lines in a second season would, it was considered, be required to free this pasture completely of barley grass.

Contagious Abortion a Costly Disease for Dairy Farmers

CONTAGIOUS abortion is a costly disease for dairy farmers, but one that is easily prevented by vaccination. One injection of vaccine will immunise a calf against the disease for a long time.

Abortion is most prevalent in young cows. Ten to 15 per cent of abortions is not uncommon in unvaccinated herds. In the season after aborting, cows produce on the average approximately 120 lb less butterfat than in a normal lactation. The loss to an individual dairy farmer in which 15 out of 100 cows aborted would be 1,800 lb of butterfat, worth about £300.

Failure to book early for calf vaccination starting in January and February could be a costly omission. Dairy farmers should make sure of a booking with a Department of Agriculture officer or club veterinarian.

The red marker dye used to delineate the exact area sprayed was very difficult to see from the driver's position on the tractor. Barley grass was killed equally well where no commercial sticker had been used, but the weather after spraying was fine for a week or more. The use of a spreading agent to effect thorough wetting of seedling foliage is probably desirable, but there was no experimental evidence that it was essential.

Spraying with a hand-held pressure gun in saleyards and other places where stock are commonly held for a few hours would be highly desirable in a campaign to prevent the further spread of barley grass to clean farms.

It is recommended that these areas be sprayed in the same way as was done in the trial along fencelines and beneath trees.

Recent Research Work

▲ The dark coloured compost with the good plants in the centre of the frame is made from peat, sand, and fertilisers.

NEW TYPES OF SEED AND POTTING COMPOSTS

ONE of the difficulties associated with the production of plants in New Zealand for sale or for planting out is the provision of a cheap, reliable, uniform, disease-free compost. Preliminary work at the Department of Agriculture's Horticultural Research Station, Levin, suggests that the U.C. Soil Mixes formulated by the University of California may fill this need.

THESE composts are made by mixing fine sand with peat or other organic matter in one of five suggested ratios together with some fertiliser and then sterilising the mixture with steam or chemicals before use. Loam, which is difficult to obtain and prepare, is not needed for these composts. The University of California suggests five proportions of organic matter and sand: pure organic matter; 3 parts of organic matter to 1 part of sand; equal parts of organic matter and sand; 1 part of organic matter to 3 parts of sand; and pure sand. For each organic matter-sand ratio the University suggests six different fertiliser mixtures. Thus there are 30 possible mixtures in all and the University of California makes only tentative suggestions as to their use.

WORK AT LEVIN Work has been done at Levin to see which of these mixtures would be most suitable for raising seedlings for planting out. Lettuce was used as the test plant. The mixtures tried were 3 parts of organic matter to 1 part of sand; equal parts of organic matter and sand; and 1 part of organic matter to 3 parts of sand. The recommended type of organic matter for these composts is undecomposed peat, but as this has not to date been readily obtainable in New Zealand (a survey aimed at defining areas of suitable types is under way), two readily available sawdusts—rimu and *Pinus radiata*—were tested as well as a peat from Raumati.

The grade of sand is very important. It must be as fine as possible, but contain no silt, clay, or salt. A suitable grade was obtained from near the mouth of the Ohau River. The local shingle company called it beach sand, but it was obtained from a place a considerable distance from the sea.

In this experiment, equal parts of peat (from Raumati) and sand gave the best results. Seed germinated quickly and evenly and the growth of the plants in the seed box was good. After the plants were pricked out growth continued to be quick and vigorous. The plants were sturdy and had plenty of fibrous roots. They were ready for planting out four weeks from pricking out and six and a half weeks from the sowing of the seed on 16 July.

RESULTS Growth was very uneven in the 3 parts of peat to 1 part of sand mixtures, while in the 1 part of peat to 3 parts of sand mixtures it was nearly as good as the equal parts of peat and sand. However, the extra weight of the mixtures containing 3 parts of sand makes seed boxes filled with them heavy to handle.

The rimu sawdust mixtures produced less satisfactory plants, but it appeared that this was due to a shortage of nitrogen in the recommended fertilisers. Further experiments are being carried out to see if a satisfactory compost can be produced from this plentiful raw material.

The radiata sawdust mixtures produced very poor plants indeed. The plants were not fit for planting out, even seven weeks after pricking out. Recent work in Australia has shown that *P. radiata* sawdust contains a substance toxic to young seedlings. It appears, therefore, that this material will not be of any use for seedling composts.

BEST COMPOST To sum up, the best compost in our experiment for raising lettuce plants was:

1 part of peat and 1 part of sand

To every cubic yard of mix add 4 oz of potassium nitrate, 4 oz of potassium sulphate, 2½ lb of single superphosphate or 2¼ lb of 44/46 per cent superphosphate, 7½ lb of dolomite lime, and 2½ lb of calcium carbonate (ground limestone)

Further experiments are being carried out to test the suitability of these composts for raising and growing on other plants and to see if rimu and other sawdusts can be used satisfactorily.

Reference

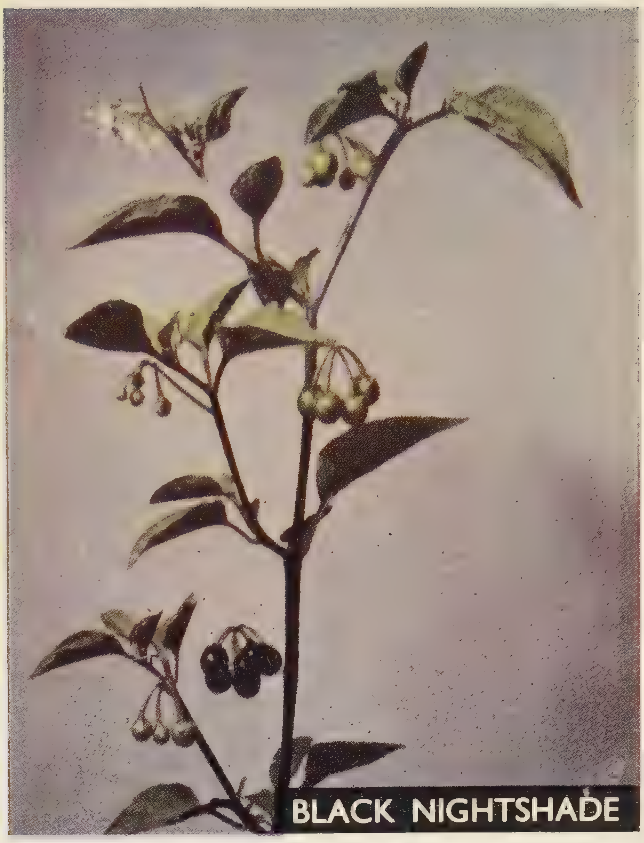
Baker, K. F. (Ed.): "The U.C. System for Producing Healthy Container-grown Plants"; Manual 23, California Agricultural Experiment Station and Extension Service.

—*A. B. WEBSTER, Scientific Officer,*
Department of Agriculture's Horticultural Research Station, Levin

WEED IDENTIFICATION AND CONTROL

By L. J. MATTHEWS,
Principal Scientific Officer,
Department of Agriculture,
Wellington

This is one of a series of articles illustrated in colour to appear in the "Journal" from time to time in which identification and control of various weeds will be discussed.



BLACK NIGHTSHADE

BLACK nightshade (*Solanum nigrum*) belongs to the *Solonaceae* (potato or tomato) family, many members of which are poisonous, the toxic principles being nicotine and strychnine. Black nightshade is often described as poisonous, but is not so listed in New Zealand. Unfortunately, black nightshade has been given a variety of common names such as wonderberry, mother of thousands, deadly nightshade, etc., and this last name has led many people to believe it has poisonous properties.

BLACK nightshade is an annual or biennial up to a foot or so high. The stem is much branched, sometimes with very minute hairs. The leaves are usually ovate (shaped like the longitudinal section of an egg with the broadest section toward the base of the leaf). The flowers are white, about ½ in. in diameter, and droop in an umbel-like stalked cluster. Black nightshade is easily recognised by its black, succulent berries about the size of a pea which grow like blackcurrants and contain many seeds.

Why is It a Weed?

Black nightshade is spread widely over nearly all the world, particularly in warmer areas. One form of the species is probably native to New Zealand, where it is widespread and is particularly troublesome in pea crops. The ripe berries are almost the same size as peas, which makes them difficult to separate mechanically. The plant is also troublesome in other crops and new pastures.

Control

A range of chemicals will give adequate control of black nightshade in many crops.

In newly sown pastures it can be controlled in the seedling stage of growth with MCPB or 2,4-DB at up to 1½ lb of acid equivalent per acre before the first grazing. The application should be made as soon as there is complete ground cover of weeds and sown species. After the seed-leaf stage the plant becomes increasingly resistant to MCPB and 2,4-DB.

In newly sown lucerne control may be obtained with 2,4-DB under the same conditions as for establishing pastures.

In peas MCPB is not very satisfactory because positive control of plants is required. Dinosam is a better material, but is not as easy and pleasant to use as MCPB. A mixture of 7½ lb of monochloroacetate and ¾ lb of MCPB shows high promise for black nightshade control in peas.

Good control of black nightshade is obtained with MCPA and 2,4-D where these materials can be used with safety such as in cereals, maize, and waste areas. As its resistance increases greatly with maturity, the application should be made as early as possible.

In onions and carrots CIPC applied before black nightshade germinates is satisfactory at 2 to 4 lb per acre; light aromatic oils also kill seedling plants in carrots. Amiben and propazine also show promise at up to 4 lb in carrots.

In nursery stock CIPC, simazine, and monuron, or mixtures of these, give excellent control.

In field brassicas monochloroacetate at 15 lb per acre controls seedling plants. This treatment also shows promise for cabbages.

In vineyards simazine or monuron either alone or with amitrol appears promising.

◆

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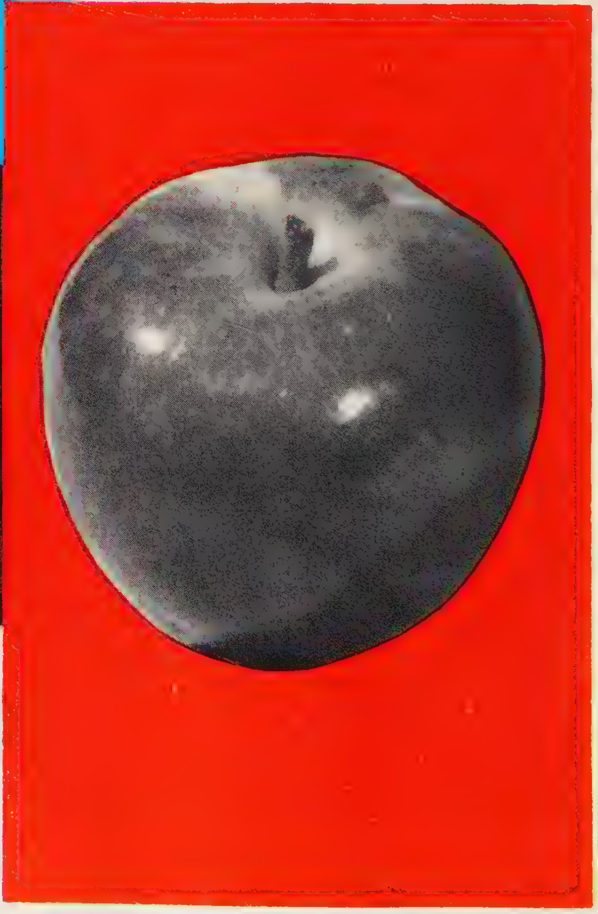

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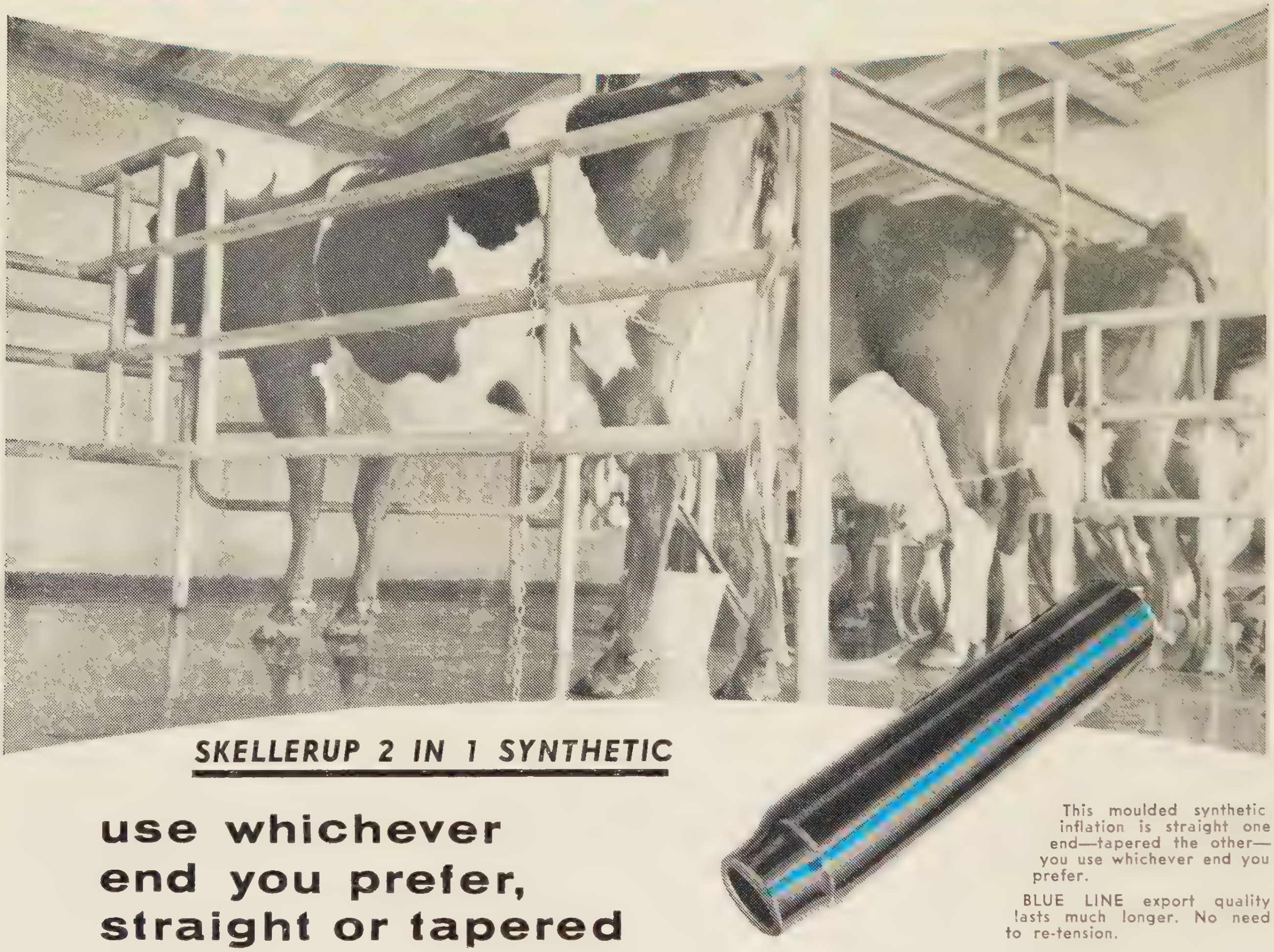

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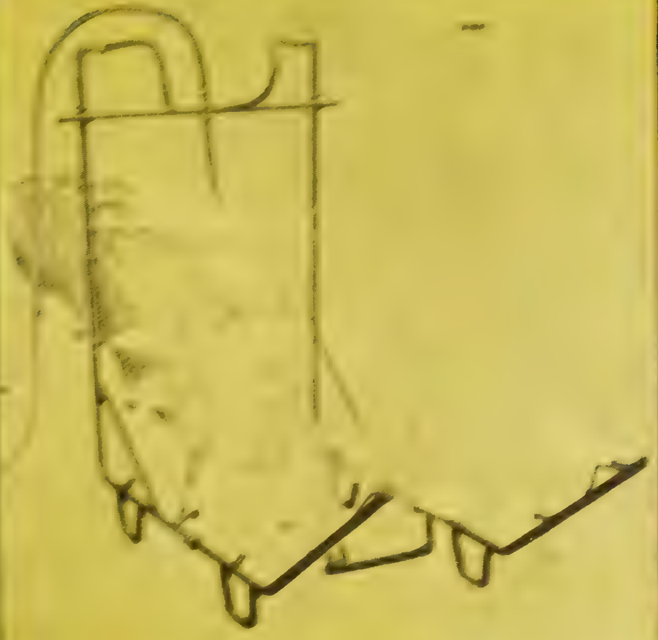

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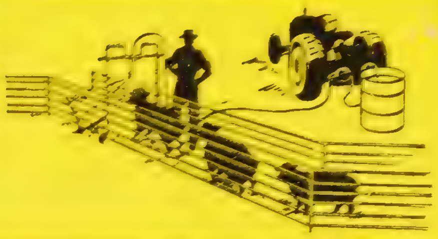

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Rate-of-seeding Wheat Trials in South Canterbury

By C. C. McLEOD,
Farm Advisory Officer, Department of Agriculture, Timaru

FOR many years in South Canterbury it has been common practice to drill both autumn- and spring-sown wheat at about 2 bushels of seed per acre with 1 to 1½ cwt of superphosphate, but variation of sowing rates has ranged from 1 to 4 bushels per acre. Nineteen wheat manurial trials since 1951 have shown that yield increases of autumn-sown wheat of about only 1 bushel per acre can be expected from wheat sown with 1 or 2 cwt of superphosphate per acre as compared with wheat sown without manure. These results, however, were obtained with autumn-sown wheat only, no experimental work having been done to find out if spring-sown wheat needed manure. Similarly, little was known of the effects of high and low seeding rates on yields of both autumn- and spring-sown wheat. To obtain this information two trials which compared rates of seeding, superphosphate application and no manure, and times of sowing (autumn and spring) were sown in 1959. In both trials the variety Aotea was used.

THE first trial was drilled in late autumn (12/6/59) on the Timaru downs at Landsborough and followed a rape crop. The soil type was a Timaru silt loam and the area gave a soil test which was average for the class of country. The sowing rates used were 1, 1½, 2, 2½, and 3 bushels per acre, each rate being drilled with no manure in some plots and with 1 cwt of superphosphate in others.

By August, after an excellent strike and establishment, 1 bushel per acre appeared to be too thin, 2½ and 3 bushels too thick, and 2 bushels about the right density. Differences due to manurial treatment were slight, sowings made without manure if anything being more vigorous than those with 1 cwt of superphosphate. At this stage the number of plants establishing per 10 ft of row (see Table 1) fairly closely followed the seeding rate.

The trial was grazed bare by sheep in mid August and, despite dry weather in September, plants were 8 to 10 in. high by mid October, when a count of the tillers (see Table 1) showed that the lower the seeding rate was the greater was the number of tillers per plant. Tillers in the 1 and 1½ bushels per acre rates were also much stronger than in the higher seeding rates.

By the end of December, after a month of warm, showery weather, the trial had made good progress and was very even; 1 and 1½ bushels per acre were still less dense than the higher seeding rates, though differences were not as marked as may have been expected. The heads per 10 ft of row were counted just before harvest (see Table 1). Measurements showed that the heads varied markedly in size, but the 1 and 1½ bushels per acre seeding rates had much less variation. These two rates were later maturing with heads better filled and about ½ in. longer than with the heavier seeding rates. There were no visible responses to superphosphate at any stage of the trial.

At harvest (8/2/60) a seeding rate of 1 bushel per acre gave the lowest yields, but there was little variation in yield between 1½, 2, 2½, and 3 bushels per acre. There was only a slight increase in yield where 1 cwt of superphosphate was drilled with the seed.

Aotea autumn sown at 1 bushel per acre (left) and 2 bushels (right).

Aotea autumn sown at 2½ bushels per acre (left) and 1 bushel (right).

The second trial drilled in spring (18/8/59) at Orari followed a swede crop. The soil type was a Waimakariri sandy loam and the area gave a high phosphate soil test, the phosphate figure being three times that of the autumn-sown trial. Rates of seeding and manurial treatments were the same as for the autumn-sown trial (1, 1½, 2, 2½, and 3 bushels per acre with and without 1 cwt of superphosphate).

Despite rather dry conditions after drilling the trial had made excellent growth by 23/9/59, plants being 3 to 4 in. high. The plants establishing per 10 ft of row were counted at this inspection (see Table 2). There were marked differences between the sowing rates, 1 bushel appearing to be too thin, 3 bushels too dense along the drills, and 2 bushels about the right density. At that stage 1 cwt of superphosphate was showing no apparent effect compared with no manure.

However, by mid October there were very marked differences between both rates of seeding and 1 cwt of superphosphate compared with no manure. The 1 and 1½ bushel seedings lacked density and no-manure plots were strikingly short, yellow, and extremely unthrifty. Because of moderately severe cornbind and Californian thistle infestation the trial was sprayed with 2 pints of MCPA weedkiller in mid October and a good kill of weeds was obtained.

Trials to Continue

TRIALS similar to those described in this article are, with some modifications, being continued this year. Some treatments which have been tried and confirmed over a number of years will be discarded and new treatments which will attempt to solve other problems of wheat growing will be included in the new trials.

In 1960-61 it is intended to:

1. Compare spring-sown Aotea and Arawa at the same seeding rates as last year (but all sown with 1 cwt of superphosphate per acre).

2. Compare the effects of grazing and no grazing on yields of Aotea and Arawa in an autumn-sown rate-of-seeding trial. (To be continued for 3 to 5 years.)

3. Compare the yields of spring-sown Aotea and Arawa (at the same rates of seeding as in 1959-60) when sown with no manure and 1, 2, and 3 cwt of superphosphate per acre.

When the tillers were counted on 4/11/59 (see Table 2) the trial had made excellent growth after heavy rain in mid October and differences between both rates of seeding and manurial treatments, though quite striking, were not nearly as marked as they had been in October. Nevertheless, plants sown without manure were about 3 in. shorter, much less flaggy, and a paler green than those drilled with 1 cwt of superphosphate, and the 1 and 1½ bushel sowings, despite good tillering, still lacked density.

Aotea autumn sown at 1 bushel (left) and 3 bushels (right).

By 26 January the plots that received superphosphate were slightly taller, denser, and earlier maturing than those drilled without manure, while the 1 and 1½ bushel rates were less dense and later maturing than the heavier rates, which appeared very similar. The heads per 10 ft of row were counted on 26 January (see Table 2); in all treatments the heads varied markedly in size. Heavy rain in December had favoured mildew attack and there was some head discolouration. There was also a little damage caused by cutworms and Argentine stem weevil.

On 17 February the trial was harvested and gave consistently large yield increases with superphosphate application and with the heavier rates of seeding.

The difference in yield between 1 bushel per acre sown without manure and 2½ bushels per acre sown with 1 cwt of superphosphate was 29 bushels per acre.

Conclusions

The rate-of-seeding trial for autumn-sown wheat confirmed results of

(Continued at bottom of page 129)

TABLE 1—RESULTS IN RATE-OF-SEEDING TRIAL WITH AUTUMN-SOWN WHEAT

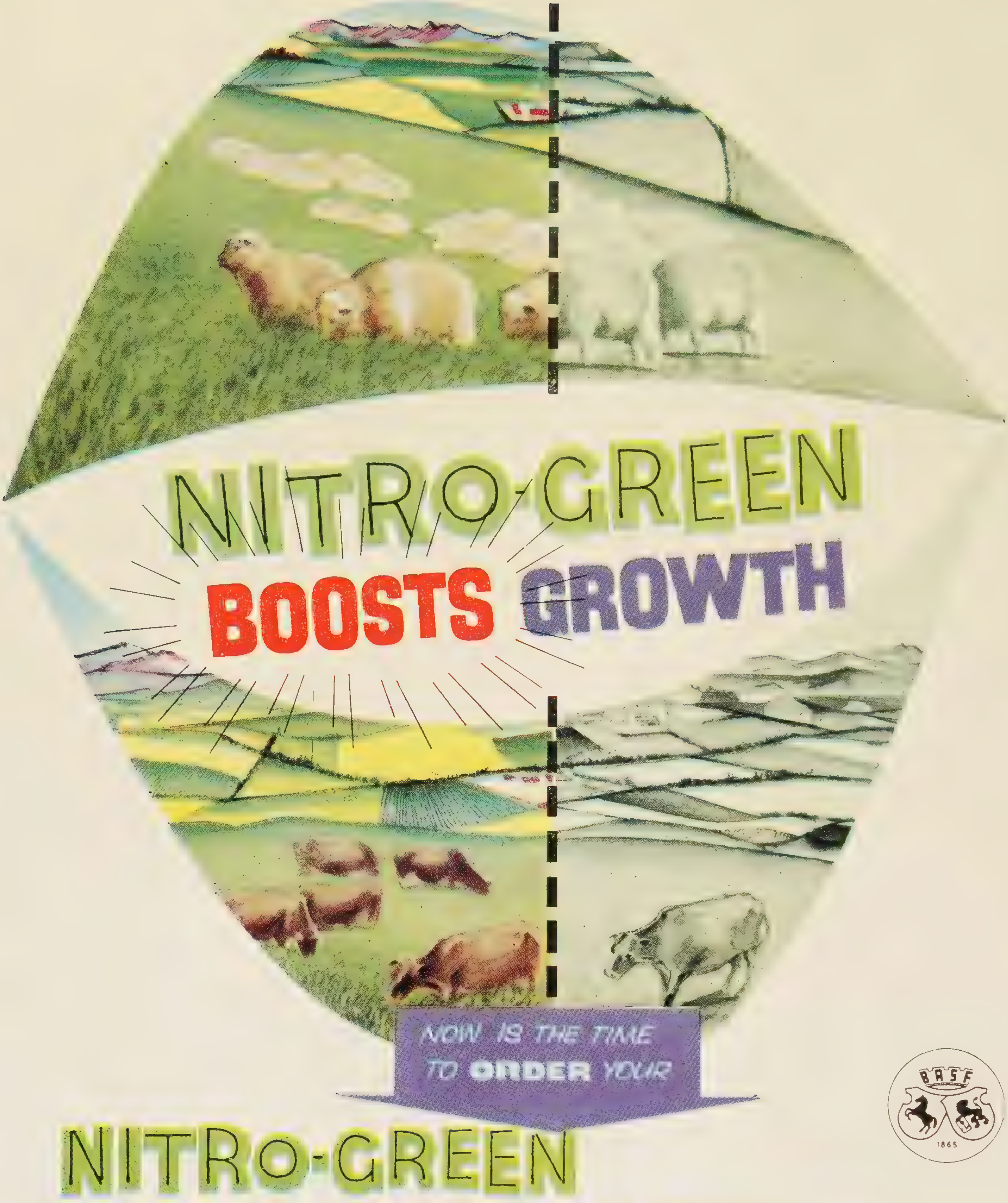
Seeding rate per acre (12/6/59)	Germinated plants per 10 ft of row (5/8/59)	No. of tillers per plant (8/10/59)	No. of heads per 10 ft of row (26/1/60)	Yields per acre (8/2/60)
lb				bushels
60	76	4.2	246	84
90	116	3.7	295	88
120	132	3.4	298	89
150	212	2.5	317	89
180	229	2.2	321	90
No manure	157	3.2	287	87
1 cwt super per acre	149	3.3	304	89

Statistical significances: The trends shown in the three categories "Germinated plants", "Tillers per plant", and "No. of heads" are supported by statistical significance between treatments in most cases. The differences in germination, number of heads, and yields due to superphosphate are also significant. In the yields from seeding rates, however, the only significant difference is that the 84 bushels from the 60 lb seeding rate is lower than any other.

TABLE 2—RESULTS IN RATE-OF-SEEDING TRIAL WITH SPRING-SOWN WHEAT

Seeding rate per acre (18/8/59)	Germinated plants per 10 ft of row (23/9/59)	No. of tillers per plant (4/11/59)	No. of heads per 10 ft of row (26/1/60)	Yields per acre (17/2/60)
lb				bushels
60	66	5.0	236	62
90	98	4.3	264	70
120	123	3.7	265	77
150	167	3.0	307	81
180	191	2.6	300	81
No manure	129	3.1	258	69
1 cwt super per acre	128	4.0	291	79

Statistical significances: The trends shown in the three categories "Germinated plants", "Tillers per plant", and "No. of heads" are supported by statistical significance between treatments in most cases. The differences in tillers, number of heads, and yields due to superphosphate are all significant. In yields from seeding rates, 60 lb is lower than 90 lb, which in turn is lower than 120, 150, and 180 lb. (The last three do not differ significantly.)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Mr G. T. de S. Baylis — A Notable Early Agricultural Experimentalist

A NOTABLE early agricultural experimentalist of the Department of Agriculture and a regular contributor to the "Journal of Agriculture" in its first decade died recently. He was Mr G. T. de S. Baylis, who served with the Department from 1907 to 1919 and who was a pioneer in the establishment of the Department's cooperative experiments with farmers.

BORN in England in 1868, Mr Baylis was educated at Brighton College and received training in sheep farming in the Falkland Islands. He worked on the old Benmore Station during the 1890s before going to South Africa, where he undertook his first agricultural research work, assisting Dr Burtt Davy in the collection and study of forage plants. On his return to New Zealand about 1907 he was for a short period Superintendent of Show Exhibits in the Department and was then appointed a Fields Instructor. In collaboration with the Chief Chemist, Mr B. C. Aston, he began in 1908 the work in cooperative experiments that was to do so much in teaching farmers how to get the most from their soil.

Farmers Encouraged to Make Own Experiments

Mr Baylis was an enthusiast not only in convincing farmers of the benefit to be gained by cooperating with the Department in experiments on their land with fertilisers, new crops, and new varieties, but in encouraging the farmers themselves to make their own experiments to find out how to get the best results.

He made this point clear in one of his "Journal" articles when he said: "There are many simple questions which the farmer could put to his soil, and which in a large number of cases would be answered by the soil in a manner which would leave little doubt as to its meaning, for the answer would be a visible one. If, then, the farmer knows the cost of the work done and material used on the 3 acres of land under the new method, the number of bags of chaff cut, or stock carried . . . he knows all that is necessary to enable him to compare it with the 3 acres on the other side of the fence which has been cultivated in the old manner".

The cooperative experiment scheme proved popular with the farming community and was regarded by the Department at the time as one of the most important of its activities. In 1913, 586 farmers were working with the Department on experiments on 5,526 plots to test varieties of cereals, fodder and forage crops, roots, grasses, methods of cultivation, and numerous experiments with fertilisers.

Mr Baylis.

Marton Experimental Plots

About 1911 Mr Baylis established experimental plots at Marton to test cereal and other crop varieties and from that venture developed the Department's Marton Experimental Area of today.

Mr Baylis wrote more than 50 articles for the "Journal" from 1910 to 1918 on a wide range of subjects which included topdressing and grazing experiments, silage, renovation of hill pastures, and varietal trials with cereals, legumes, root crops, and lucerne. Some of his articles were among the first to discuss improvement of yields from pumice and gumland soils, the potentialities of which were so little realised at the time.

Rate-of-seeding Wheat Trials in South Canterbury

(Continued from page 127)

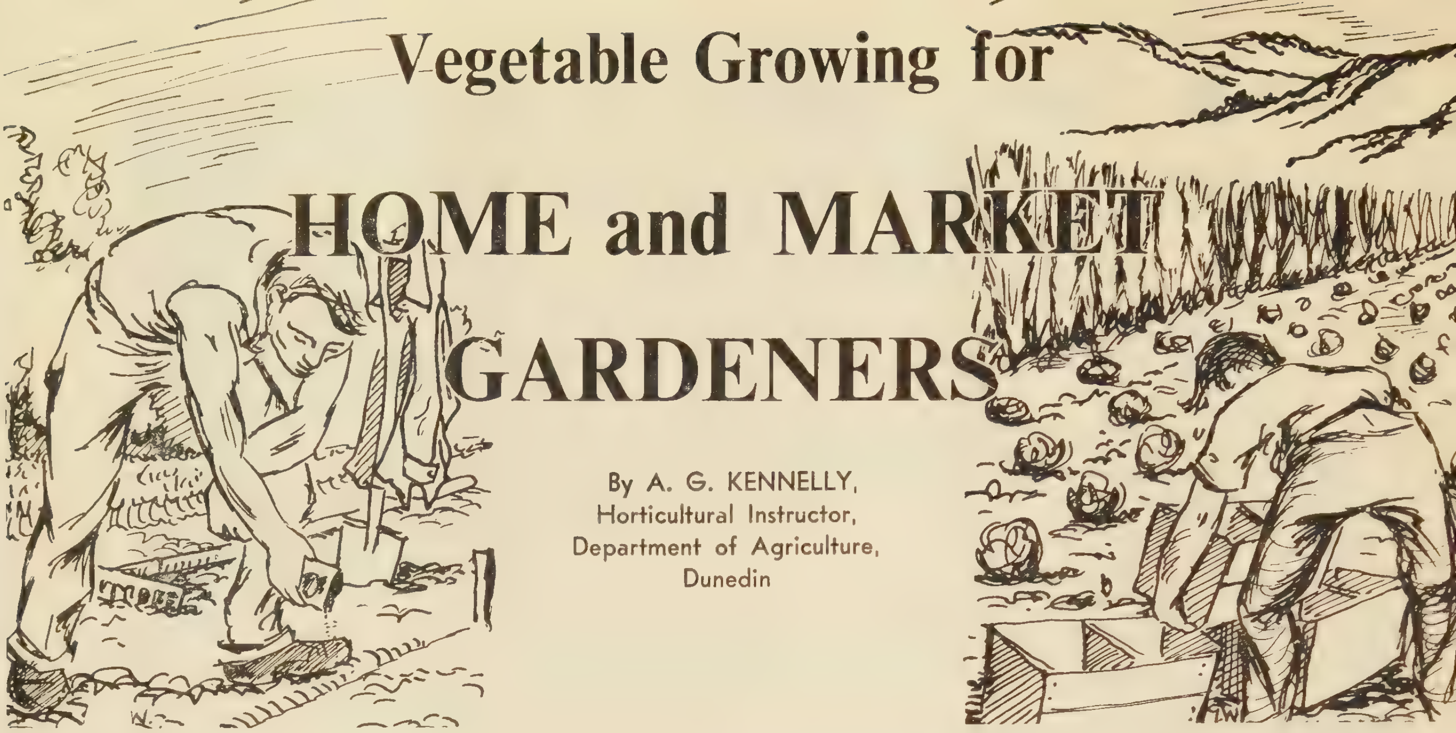
earlier manurial trials in showing that in South Canterbury little response to superphosphate application can be expected with autumn-sown wheat. Though there were fewer heads at the lower seeding rates, they were larger, better filled, and had higher yielding individual heads than the heavier rates. Consequently, the yields of all seeding rates at harvest were fairly similar; 1 bushel per acre gave a lower yield than the heavier seeding rates, but it is apparent that it is unnecessary to sow more than 2 bushels of seed per acre in autumn.

Recommendations from this and other trials and from field observations are: For autumn-sown wheat in South Canterbury drill 1½ to 2 bushels of seed per acre without any manure. However, if wheat grazing is desired, it may be an advantage to drill 1 cwt of superphosphate with the crop, as superphosphate frequently stimulates leaf growth in autumn and spring compared with no manure (though sowings have usually evened up and given similar yields by harvest).

In the spring-sown trial superphosphate application stimulated tillering and resulted in significantly more heads and a substantial increase in yield (10 bushels per acre). This was in marked contrast with the results from the autumn-sown trial but in line with the increases in yield due to superphosphate application obtained in spring-sown oats and barley trials. At the lighter seeding rates there was increased tillering, but this was insufficient to produce numbers of mature seed heads equal to those of the higher rates of seeding.

The increases in yield in spring-sown wheat appear to depend on an increased number of heads rather than on an increase in yield from the individual heads. Compared with wheat drilled in autumn, wheat sown in spring has a very short growing season and there is probably little time for light seeding rates to develop large, well filled ears.

It is apparent that 2 to 2½ bushels per acre with 1 cwt of superphosphate should be sown with spring wheat in South Canterbury. For spring sowing, superphosphate and a little more seed than for autumn sowing are required. Very heavy seeding rates, however, appear to be unnecessary.



Vegetable Growing for HOME and MARKET GARDENERS

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

Rhubarb

RHUBARB thrives best in regions having relatively cool, moist summers and cold winters. In warmer climates it loses its vigour fairly rapidly. It will grow in poor conditions, but it is a gross feeder and responds well to a favourable environment. The large, fleshy stems that are the edible part of the plant are produced in part from the plant food stored in the roots, the development of which should be encouraged by cultivation and manuring.

RHUBARB can be grown in a wide range of soils and situations, but a deep soil rich in humus and retentive of moisture and a sheltered but unshaded situation are preferred; dry, sandy soils and heavy, cold clays produce less profitable crops. Commercially the best crops are grown in alluvial soils that have been well cultivated and kept in good condition by abundant animal manure. Before planting, the soil should be dug or ploughed as deeply as possible without bringing subsoil to the surface. It must also be cleared of all perennial weeds such as convolvulus or couch grass.

It is advisable before planting to work in heavy dressings of well rotted farmyard manure or other organic material such as compost, rotted straw, leaves, and stack bottom. Rotted straw, leaves, and stack bottom contain little nitrogen and should be sprinkled with sulphate of ammonia before being turned in. The soil should then be rolled or trodden to firm it for planting.

Drainage

The site for rhubarb must be well drained. If it waterlogs in wet weather, some form of drainage must be installed. In a commercial garden installation of a drainage system is expensive and should be planned by an expert.

Propagation and Planting

Propagation is usually done by division of old crowns (roots), as this ensures new plants being true to the parent variety. However, rhubarb is also propagated satisfactorily from seed, and this is the common practice in warm districts, where plants lose vigour fairly rapidly

Seed should be sown in early spring 1 in. deep in good soil in rows 1 ft apart. Seed remains viable for from three to eight years. Fresh seed germinates readily and if started and grown in good conditions, plants become fairly large the season in which seed was sown.

Seedlings must be thinned promptly to about 6 to 8 in. apart in the rows. During the following autumn or spring the most promising plants should be selected, carefully dug up, and planted in their permanent positions. Planting should be carried out when the crowns are dormant or when those which do not die down are relatively dormant.

In southern districts where the climate favours rhubarb, beds may last up to nine or 10 years, but it is advisable after three or four years to reduce the size of each crown, as the crowns deteriorate and develop so many buds that the stalks become too numerous, thin, and weak and the crowns hollow and weakened.

In commercial culture the crowns may be reduced by cutting through them when dormant with a plough and lifting out one section of each, or by removing the soil from one side of each crown, cutting the crown through with a sharp spade, and lifting out part of it to leave three or four buds undisturbed.

Wider Scope of Gardening Notes

A CHANGE in the monthly gardening article has been made from this issue. The notes each month will deal principally with the culture of one vegetable and will cover both commercial and home garden practice. Information from trials conducted at the Department of Agriculture's Levin Horticultural Research Station and other experimental areas will be included as it becomes available.

In the home garden greater care can be taken and the entire crown lifted, the roots trimmed, and the reduced crowns, with only a few eyes, replanted in a newly prepared bed. A three-year-old crown should divide into at least six good sets. Each set or piece with its bud can then be planted firmly with the bud about 1 in. below the surface.

Planting

It is better not to replant crowns in the old bed if disease is present or suspected, as the healthy crowns may become infected.

Planting distances must be determined by the vigour and habit of the variety and on commercial areas by the kind of inter-row cultivation used. In the home garden, where cultivation is done with hand tools, planting can be closer.

From 2 ft to 4 ft each way, according to variety, is usually adequate. The number of crowns required to plant an acre can be determined by multiplying the planting distance each way (in feet) and dividing into 43,560. The following table gives the principal planting distances with the appropriate number of plants per acre:

Planting distances ft	Approximate number of plants per acre
2 x 2½	8,710
2½ x 2½	6,970
2½ x 3	5,810
3 x 3	4,840
3 x 4	3,630

Surface Cultivation

As soon as growth begins the soil should be surface cultivated to destroy weeds, and cultivation should be repeated at 7- to 14-day intervals until leaf growth prevents further work, by which time most weed growth should be smothered. In late autumn, when the roots are dormant, a shallow furrow can be turned on to the crowns from either side of the row to check weeds and to assist drainage. This covering should be raked off at the first sign of growth in spring. Cultivation should be shallow or the roots may be damaged.

Many varieties of rhubarb produce seed heads freely throughout the season after the beds have been established for two years.

Seed heads should be removed promptly (unless seed is required), as their growth and the production of seed tend to reduce both the vitality of the plant and the yield.

Manuring

As the repeated pulling of stalks is exhausting to plants, they should be manured liberally. Adequate nitrogen, phosphate, and potash are essential for the proper development of the stalks, though with its thick, succulent stems and leaves, rhubarb responds especially well to nitrogenous manures.

Relatively little inorganic fertiliser need be given if sufficient organic manure (such as well rotted farmyard manure or fowl manure) is applied, as such manures, besides being rich in plant food, have a high value as producers of the water-holding humus which is so necessary for rhubarb production.

If insufficient is known about the plant food available in the soil in commercial gardens, an indication of manurial requirements can be obtained from soil analysis. However, many commercial growers obtain excellent results from farmyard manure at 20 to 25 tons an acre or fowl manure at 6 to 12 tons an acre. The home garden equivalent of 20 to 25 tons of farmyard manure an acre is about 9½ to 11½ lb a square yard.

If farmyard or fowl manure is not available, blood and bone at up to a ton to the acre (about 8 oz a square yard) can be substituted. Supplementing it by heavy dressings of organic matter such as compost, rotted straw, or stack bottom will ensure that the soil tilth or physical structure is well maintained.

When only inorganic manures are to be used a side dressing applied just before growth begins of up to 3 cwt of sulphate of ammonia, 6 cwt of superphosphate, and 1 or 2 cwt of

▼ Boxes used for forcing rhubarb. Any box which is deep enough to permit a good length of stalk to develop and will exclude frost and restrict light is satisfactory.

[Green and Hahn

Seed Sowing Table for September

Vegetables H Hardy, HH Half hardy, T Tender (terms are relative indications only)	Seed Needed for 100 ft of Row	Planting Depth in.	Distance between Rows in.	Distance between Plants in Rows in.	Notes Plan for continuity of supply according to space available. Do not work on the garden if the soil is very wet.	Some Recommended Varieties	Some Basic Manurial Recommendations
Asparagus (H)	½-1 oz	½	36-60	18	Late for setting out plants. Seed may be sown, but it does not come true.	Mary Washington No. 500, Connovers, Paradise Early, K.B.F.	**1. To Maintain Soil Condition** ((b) Below also supplies substantial plant food.) (a) Whenever possible grow and dig in a green manure crop such as barley, oats, mustard, or lupins or dig in rotted straw or well rotted sawdust mixed with rotted vegetable or animal matter. And/or (b) apply organic matter such as poultry or farmyard manure. If enough is applied, (2) below will be unnecessary. **2. To Supply Plant Food** Broadcast at 3 to 6 oz to the square yard according to need the following: **Parts by weight** Blood and bone .. 7 Superphosphate .. 7 Dried blood .. 2 Sulphate of ammonia .. 2 Muriate or sulphate of potash .. 2 Leafy vegetables may benefit by side dressings of a combined fertiliser higher in nitrogen, but the above will give good results on most soils in good physical condition. Where there is evidence of specific deficiencies further suitable materials can be added, for example, magnesium sulphate (Epsom salt) for magnesium deficiency and molybdenum or molybdenised superphosphate for molybdenum deficiency, to which whiptail of cauliflower is due. Such dressings can be dissolved and watered on as sprays or side dressings, whichever is most appropriate.
Beans, Broad (H)	9 oz-1 lb	1½-2	24-36	4-6	Late for sowing. Sow only where soil is likely to retain moisture.	Early Longpod	
Beans, other (T)	½-1 lb	1-1½	24-48	2-8	Late in the month and only in mild northern districts not subject to late frosts.	**Dwarf:** Tender Green, The Prince **Runner:** Fardenlosa, Westralia	
Beetroot (H)	¾-1 oz	½	12-15	2-4	A small early sowing.	Early Wonder, Detroit Dark Red	
Brussels sprouts (H)	¼ oz	¼-½	24-36	18-24	An early sowing (only if a long season of harvesting is wanted).	Fillbasket, Cambridge types, Jade Cross	
Cabbages (H)	¼ oz	¼-½	18-36	12-24	For summer use.	Golden Acre, Copenhagen Market, Green Acre	
Carrots (H)	1/16-¼ oz	½	12-15	2-4	A small early sowing.	Chantenay, Taranaki Strongtop, Nantes	
Cauliflowers (H)	¼ oz	¼-½	18-30	15-24		Early London, Walcheren, All Year Round	
Celery (HH)	⅛-¼ oz	⅛-¼	8-12	8-12	An early sowing under glass (in districts not subject to late frost) for planting in the open later.	Self-blanching and green	
Celeriac (H)	¼ oz	⅛-¼	15-18	5-6		Celeriac, Giant Smooth Prague	
Cucumbers (T)	1/5-½ oz	½	36	18	Sow under glass for planting when frost danger is past.	Marketer, Crystal Apple	
Chinese cabbages (H)	¼ oz	½	18	12		Wong Bok (Pao Ting), Pe Tsai, Chihli	
Kohl rabi (H)	½ oz	½	12-15	6	A good time to sow in most districts.	White Vienna, Short Top Green	
Leeks (H)	½-1 oz	½	12-18	6	An early sowing.	London Flag, Musselburgh, Lyon	
Lettuces (H)	1/20-½ oz	¼	12-18	8-12		Imperial 44, Imperial 847, Triumph, Great Lakes 428, Great Lakes 659, Webbs Wonderful	
Marrows (T)	½-1 oz	½-1	36-48	18	See cucumber.	Long White, Long Green	
Onions (H)	1/5-1 oz	½	12-15	3-6	Successional sowings for salad onions; sow main crop in South Island.	**Longkeeping:** Pukekohe **Early:** Ailsa Craig, Straw Spanish, Silver Skin	
Parsnips (H)	½ oz	¼-½	12-18	4-8	October, November, or, in the north even December sowing is usually preferred.	Hollow Crown, Oxheart	
Parsley (H)	—	⅛-¼	—	—		Fine Curled	
Peas (H)	¾-2 lb	1-2	20-36	2-3	Sow for early harvesting and also for continuity of supply.	Little Marvel, William Massey, Victory Freezer, Greenfeast	
Potatoes (T)	10-20 lb	4	24-27	10-16	An early planting; requires protection from frost in most districts.	Cliffs Kidney, Jersey Bennes, Epicure, Chippewa, Arran Banner, Ilam Hardy	
Pumpkins and squash (T)	½-1 oz	½-1	36-48	18	See cucumber.	Butternut, Triamble, Queensland Blue	
Radishes (H)	¼-1 oz	¼	12	1-2	Successional sowings.	French Breakfast, White Icicle	
Rhubarb (H)	½-1 oz	1 (seed)	24-36	24-30	Late for planting most varieties. Seed can be sown.	See page 134	
Silver beet (H)	1 oz	¼-¾	15-18	8		Fordhook, Dark Green Broad Ribbed	
Spinach (H)	½-1 oz	¼-½	12	2-4		Bloomsdale	
Swedes (H)	1/7-1 oz	¼	12-18	6-8	An early sowing can be made, but late summer sowing is preferred in most districts.		
Tomatoes (T)	⅛-¼	⅛-¼	36-48	12-20	Plant out in unheated houses. Sow for planting in the open.	**Tall varieties:** Potentate, Moneymaker, Bay State, V548, Syston Cross **Dwarf:** Stoners, Dwarf Gem, The Amateur	
Turnips (H)	1/10-¼ oz	¼	12	3-4	Sow successionally.	White Stone, Milan	

sulphate or muriate of potash an acre (1 oz, 2 oz, and $\frac{1}{3}$ to $\frac{2}{3}$ oz per square yard respectively) can be given. Whether or not an organic mulch such as farmyard manure is given, the crop will usually benefit from side dressings of 2 to 3 cwt an acre of sulphate of ammonia (1 oz per square yard) or even heavier applications of dried blood after the first pulling, followed by a similar dressing after pulling is finished.

The last application assists the plant to build up the crown for the following season. However, as early dying down of the leaves and ripening of the crown are important factors in successful rhubarb culture, no stimulating fertilisers should be given later than the one after the last pulling. In home gardens dry fowl manure mixed with wood ashes and superphosphate makes a good topdressing for rhubarb.

Lime

In home gardens 2 to 3 oz of lime a square yard annually or proportionately more at longer periods (15 to 20 cwt per acre every three years on commercial areas) should give satisfactory results in districts of moderate to fairly heavy rainfall.

Forcing

Rhubarb is easily forced in any situation where moderate warmth can be given, but only early maturing varieties should be forced. The usual field method in New Zealand is just to provide some form of protection, such as boxes or straw, against frost and to some extent cold. Any box which is deep enough to permit a good length of stalk to develop and will exclude frost and restrict light is satisfactory.

[Green and Hahn

Flax ties used on bundles of rhubarb are generally attached to the picker's leg as shown.

If plants are forced in the absence of light, stalks become cherry red and the development of the leaf blade is retarded. Such rhubarb is regarded as of better quality than that grown under ordinary conditions. It is less acid, the skin is tender, and very little trimming is needed before cooking.

Harvesting

On new beds no stalks should be pulled the first year and, unless growth has been very good, only a few in the second year. In the third and subsequent years the principal varieties may be pulled from September until early or mid December. No further stalks should then be pulled, as enough leaves must be left to store food for the next season's crop. Commercially, ever-bearing varieties are generally harvested from autumn until early spring and then allowed to recover.

In southern districts the harvesting of early forced rhubarb starts about the first or second week in September and is usually completed in about four to five weeks, when the main crop is coming in. Pulling begins as soon as the stalks have reached a marketable size.

Each stalk is grasped firmly near the base and pulled with a twisting motion so that the crown is not damaged. The number of times a crop is pulled may vary from a single heavy pulling to four or five relatively light pullings. With winter or ever-bearing varieties, however, it is usual to go through the crop in late autumn, winter, and early spring and pull good stalks as they develop. As summer advances no further stalks should be pulled or the weight of the crop in the following year will be seriously reduced.

Commercially, the stalks are pulled when ready and bundled as soon as sufficient are gathered by tying the ends of each bundle, usually with flax, suitable lengths of which are first cut and placed in a handy position. Generally ties are doubled over and attached to the leg of the picker. Raffia or rubber bands are also used.

The size of bundles of early and main crop rhubarb is usually determined by the number of stalks the puller can hold in his hand, usually a bundle about 9 to 10 in. in circumference. The leaves of main crop

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Virus Y-free Aucklander Short Top Potatoes

ALL plants of the potato variety Aucklander Short Top have been thought for a long time to carry both mosaic viruses X and Y, apparently without symptoms; but keen observation by a Department of Agriculture officer a few years ago detected a more than normally healthy plant from which the Department has raised a selection free from infection with virus Y. By the 1961-62 season sufficient supplies of this new selection should be available generally to commercial growers and perhaps to home gardeners also.

Though it is not one of the heaviest yielding varieties, Aucklander Short Top has for many years been the most widely grown variety in New Zealand. The virus Y-free selection is capable of producing heavier yields than the standard plants through its ability to produce more tubers rather than because the individual tubers are larger.

The virus Y-free selection was first isolated by Mr S. M. J. Stockdill, now Fields Instructor in the Department of Agriculture at Palmerston. Mr Stockdill was formerly stationed at Dunedin, where he supervised the Department's seed potato certification trial plots.

In the 1952-53 season he saw an apparently more healthy plant, and the Crop Research Division of the Department of Scientific and Industrial Research reported that though the plant was still carrying virus X, it appeared to have escaped infection by virus Y.

Aided by Mr C. M. Driver, of Crop Research Division, Mr Stockdill was able to multiply the initial supply of tubers. Sufficient were available last year to supply to a number of selected experienced commercial growers for growing-on as seed. Their crops have been certified under the Department of Agriculture's seed potato certification scheme, and the produce is being distributed for multiplication to other growers in suitable seed-producing areas.

The elimination of virus Y has lengthened the growing period of the new selection by two to three weeks. This may be a disadvantage in some districts where early maturity is important. The virus Y-free stocks can readily become reinfected, particularly when grown near ordinary Aucklander Short Top stocks or near the Aucklander Tall Top variety, which also carries 100 per cent infection of the virus.

If the new selection meets the requirements of commercial growers in other respects, it may replace the present Aucklander Short Top stocks and eliminate a source of infection of virus Y to other varieties.

rhubarb are trimmed off near the leaf bases, but leaves of forced rhubarb are left intact or only partly trimmed.

With main crop varieties under average conditions a worker can pull, bundle, and cart off about 36 to 42 bundles an hour, but men who have become expert can do much more than this. When rhubarb is shipped in sacks the bundles are placed in layers with the leaf ends in alternate directions so that the leaves may afford some protection against bruising of the stalks. A one-stripe sack in mid-season normally holds from 3 to 3½ dozen bundles and weighs just over 1 cwt. Main crop rhubarb is also sometimes marketed in apple cases.

Yields

Yields vary greatly according to variety and conditions. An exceptionally good bed may yield over 25 tons to the acre, though 12 to 15 tons to the acre could be regarded as a satisfactory yield for the main crop. Pullings from many strains of rhubarb grown for winter use are lighter than those from main crop, and so too are early pullings.

Varieties

Where winters (by New Zealand standards) are severe, rhubarb is mainly harvested in spring; and where summers are very dry and winters are not too severe, it is dormant in summer but grows well in winter and spring. Varieties differ somewhat in their response to climatic conditions and in the principal rhubarb growing districts in New Zealand they are usually grouped as early, main crop, and everbearing or winter, according to variety and response to growing conditions.

Commercial growers usually prefer vigorous varieties with red stalks, though the public demand for red stalked rhubarb is not consistent. About a dozen varieties of rhubarb are recognised or listed, but because of uncertainty of quality and performance commercial gardeners usually prefer to obtain a variety whose merits they know.

Valuable information should emerge from variety trials of rhubarb being conducted by the Crop Research Division of the Department of Scientific and Industrial Research at Lincoln. Assessments are being made over a number of years of such factors as early and total yields, number of stalks, their colour and length, chemical and vitamin content, and resistance to disease.

Diseases

Virus disease is easily recognised by mottling of the leaves and by a stunting of the plant where the attack has been more serious. There is no cure. Affected plants should be dug out and burnt as soon as they are noticed. Anyone handling diseased plants should wash his hands before touching unaffected plants.

Crown rots and root rots due to various fungi and bacteria are occasionally troublesome. Control in most cases consists of the removal and burning of affected plants.

Commercial growers with beds affected by disease should consult their local Department of Agriculture instructor to have the cause of the trouble identified and to get advice on control measures.

Leaf spots due to fungi are occasionally troublesome, but can usually be disregarded.

Frost Damage

Rhubarb is hardy, but the leaves are occasionally damaged by a late frost. Forced rhubarb is especially susceptible and covers removed during harvesting should be replaced properly.

Meteorological Records for June

Station	Height of station above M.S.L. (ft)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	52.8	+ 0.7	65.5	36.3	7.41	21	+ 0.33	2.69	7	142
Auckland	160	54.4	+ 1.4	65.6	42.7	5.75	22	+ 0.36	1.05	8	130
Tauranga	12	50.7	+ 0.8	65.4	33.0	5.19	17	— 0.36	1.62	24	127
Ruakura	131	49.0	+ 1.5	65.1	27.0	6.93	17	+ 2.15	1.28	24	112
Whakarewarewa ..	1,006	47.2	+ 1.9	64.3	28.3	5.71	15	+ 0.18	1.44	7	103
Gisborne	14	50.5	+ 1.7	67.7	31.2	6.47	19	+ 2.26	1.52	7	125
New Plymouth ..	160	51.4	+ 1.3	64.0	38.0	7.41	16	+ 1.23	2.45	4	88
Karioi	2,125	42.6	+ 1.1	59.5	23.6	3.52	17	— 1.58	0.62	6	
Napier	5	49.8	+ 1.1	70.2	31.5	5.34	13	+ 2.28	1.41	7	127
Wanganui	72	49.5	+ 0.7	60.1	31.6	1.73	15	— 1.66	0.39	6	94
Palmerston North ..	110	48.1	+ 1.1	60.5	30.3	2.14	16	— 2.21	0.37	4	98
Waingawa	340	46.6	+ 1.2	62.9	27.8	3.50	15	— 0.59	0.63	22	113
Wellington	415	49.2	+ 1.5	59.7	38.2	6.17	20	+ 1.52	0.87	20	83
Nelson airfield ..	5	46.6	+ 2.5	60.8	28.8	4.08	13	+ 0.79	1.13	4	129
Blenheim	12	46.2	+ 1.3	62.6	28.0	2.55	14	+ 0.07	0.78	4	104
Hokitika	15	46.4	+ 2.1	59.5	27.9	9.95	14	+ 1.12	1.88	3	111
Hanmer	1,270	40.2	+ 0.5	63.0	21.0	8.36	13	+ 4.87	2.78	20	74
Christchurch ..	22	44.6	+ 1.4	65.2	27.8	4.92	14	+ 2.33	1.17	20	96
Ashburton	323	44.2	+ 2.4	65.0	24.2	5.87	12	+ 3.27	2.40	21	97
Timaru	56	43.7	+ 1.3	59.1	27.3	2.22	14	+ 0.35	0.48	7, 22	93
Alexandra	520	39.0	+ 1.3	57.5	22.1	0.79	9	+ 0.00	0.27	18	54
Taieri	80	42.8	+ 1.0	60.6	23.2	6.65	15	+ 4.33	1.85	4	80
Invercargill airfield ..	0	42.4	+ 0.8	58.3	25.3	6.63	19	+ 2.98	1.57	19	64
Chatham Islands ..	150	48.9	+ 2.4	59.1	37.0	5.29	21	+ 1.39	0.97	1	

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during May 1960 and for the 10 months ended 31 May 1960 with comparative figures for the same month and for the 10 months of 1959 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
May 1960	2,926	110	3,036	—
May 1959	3,861	110	3,971	—
Decrease	—935	—	—935	—23.545
10 months ended 31/5/60	158,390	2,962	161,352	—
10 months ended 31/5/59	174,685	2,700	177,385	—
Increase or decrease	—16,295	+262	—16,033	—9.038

Butter in store at 31 May 1960 was 22,900 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
May 1960	3,694	239	3,933	—
May 1959	4,260	6	4,266	—
Increase or decrease	—566	+233	—333	—7.806
10 months ended 31/5/60 .. .	75,063	11,316	86,379	—
10 months ended 31/5/59	65,611	13,429	79,040	—
Increase or decrease	+9,452	—2,113	+7,339	+9.285

Cheese in store at 31 May 1960 was 13,326 tons

If these figures are converted into butterfat equivalent, there is a decrease of 5.975 per cent in butterfat graded for the 10 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export and do not include butter and cheese which are used on the local market and products such as anhydrous milk fat, whole milk powder, and other whole milk products, and are not necessarily a true indication of production trends.

The Home Orchard in Spring

By S. FREW,
Instructor in Horticulture,
Department of Agriculture,
Christchurch

INSECT pests emerge and fungous diseases develop rapidly in spring in the home orchard and the only practicable means of combating them is by spraying. In this article hints on this work are given, with specifics for common orchard pests and diseases. Other spring work in the orchard is also discussed.

A STUDY of the following points in spraying technique may serve as a guide to better disease control.

Spray Thoroughly

Satisfactory disease control cannot be secured by faulty application or inadequate coverage. For the spray to function efficiently all parts of the tree must be completely covered with the preparation. Most of the failures to obtain good pest and disease control, even when the correct sprays are applied, may be attributed to inadequate spray coverage.

Spraying Trees in Full Foliage

Efficient coverage is relatively simple when the trees are in the dormant or bud-burst stages, but once they are in full foliage with numerous growing points good coverage is not so simply achieved.

The foliage must be completely covered with spray, particularly the undersides of leaves. Many fungous diseases develop on that part of the foliage, and insect pests are more likely to harbour in this partially protected area. The only satisfactory way to spray in full foliage, therefore, is to direct the spray nozzle upward. This will ensure the undersides of

Upper—A knapsack sprayer is probably the most convenient type for home gardeners. Lower—Grassed orchard, illustrating value of inclusion of clover in the sward for promotion of the nitrogen cycle. Note beehive for pollination service.

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leaves receiving a coating, and the excess spray will drift down on to the upper surfaces of leaves. Fruit clusters should also receive special attention, ensuring that the spray penetrates fully.

Spray Regularly

Much of the purpose of spraying is to prevent rather than cure disease and to achieve this it is necessary not only to use the correct sprays at the right time, but also to keep fruit and foliage fully covered while any particular pest or disease is active.

During the growing season the foliage is increasing in extent and the fruit in size, so spray application must be frequent enough to protect the new areas as they develop.

Equipment for Spraying

Much poor spray coverage is caused by inadequate spraying equipment. The pump must be capable of delivering the spray at sufficient pressure to penetrate to the innermost portions of branches, while the spray nozzle must be of a type which will convert the spray material into a fine mist.

The finer the moisture particle the better is the coverage. Coarse droplets do not provide an effective cover.

For large trees a reliable bucket pump fitted with 10 or 12 ft of strong ¼ in. hose and a 4 or 5 ft lance with a disc nozzle is the most satisfactory for use in the home orchard. For smaller trees a knapsack sprayer is suitable and probably is the most convenient type for many home gardeners.

Mixing Sprays

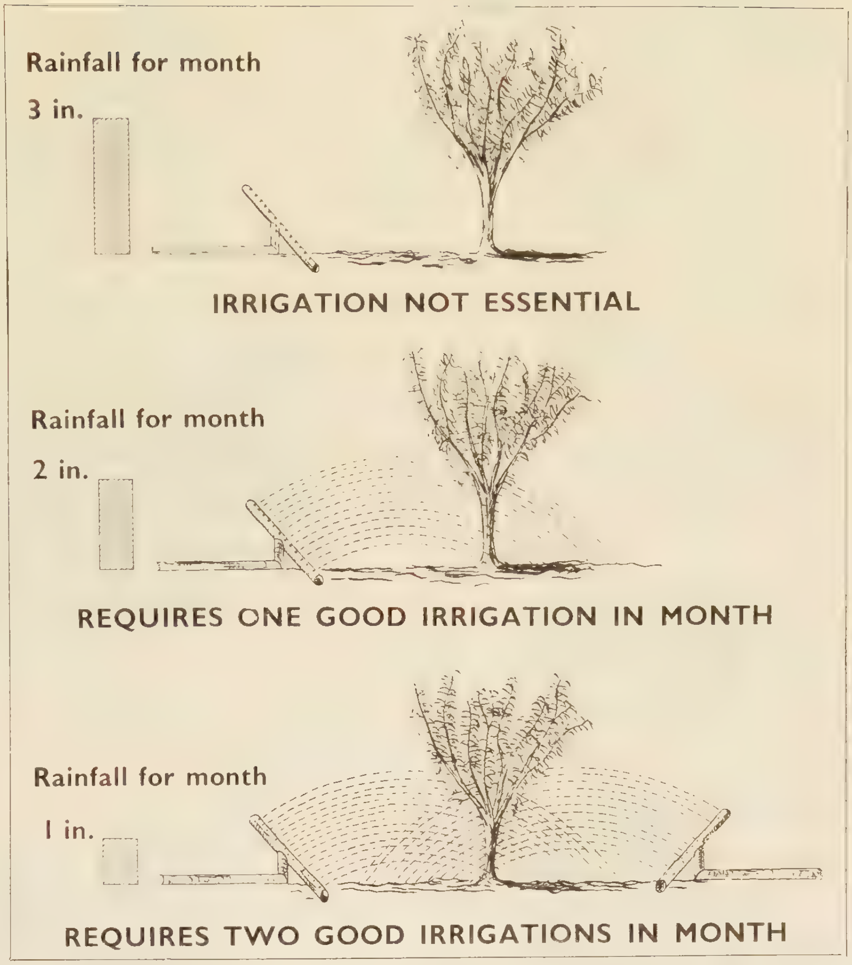
Most spray materials are liquids or wettable powders and mix readily with water.

Frequently **combination sprays** are recommended and care should be taken in mixing them. A good guide in mixing combination sprays is the rule: **add the suspension to the dilution.** Wettable powders, for example, being merely held in suspension by water, should be added to liquid sprays which have already been diluted in the spray tank. Care should be taken, of course, to ensure that the two sprays being mixed are compatible; otherwise damage might result. A guide to compatibility is usually given with the instructions on the spray container.

Measuring Small Quantities of Spray Materials

Recommended dosages are usually given in ounces, either by weight or as fluid ounces. As it is important that the measured quantities should be accurate, a **graduated measuring glass** marked in fluid ounces should be used. Such glasses are readily available cheaply in city stores and are much more satisfactory than measuring with kitchen spoons, which vary greatly in size and capacity.

IRRIGATION OF FRUIT TREES



A good irrigation would provide the equivalent of 1 in. of rainfall or about 5 gallons of water for every square yard within the area covered by the tree's overhanging branches.

When measuring dry materials or other materials measured by weight the following conversion table may be used:

Material		1 oz by weight equals
Bluestone powder	..	1 fl. oz.
Colloidal sulphur	..	1 fl. oz.
Hydrated lime ..	..	1½ fl. oz.
Lead arsenate ..	..	1½ fl. oz.
DDT or DDD ..	..	1½ fl. oz.
Captan	..	2 fl. oz.
Malathion (w.p.)	..	2 fl. oz.

Estimating Quantities of Spray Required

The amount of spray to give full coverage of a tree depends first on the size of the tree and second on the stage of development at time of application. The following table is, of course, only approximate, but is a guide.

Spray Required for One Tree (Approx.)

Type of tree	Dormant pints	Petal fall pints	Full foliage pints
2 to 3 years ..	1	2	4
6 ft high with 4 to 5 ft spread	3	4	8
10 ft high with 6 to 8 ft spread	4	8	14

Points to Remember

1. Do not spray during the extreme heat of the day. Leaf or fruit scorch may result.

2. Do not spray late in evening, as the slow drying of the spray may cause damage.

3. Do not spray while trees are still wet after rain.

4. If considerable wet weather occurs after spraying, do not wait the full interval before applying the next spray.

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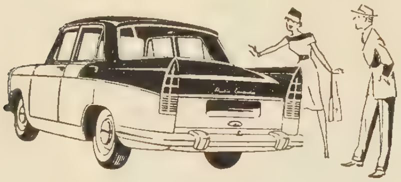

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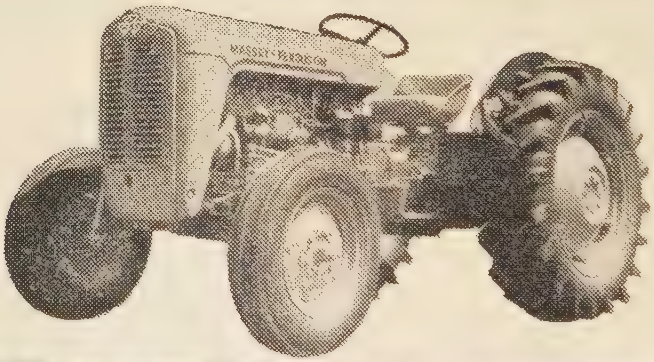

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Dealers Everywhere.

5. Use spray materials as soon as possible after mixing.

6. Keep spray well agitated, even when using.

7. Thoroughly wash out spray container with clean water after use.

Spray Programmes

A wide range of sprays is available to the home orchardist. Many are equally as effective as those mentioned in the programmes given below.

Soil Management

Fruit trees may be grown either in grass or under clean cultivation. To prevent competition for available moisture in grassed down areas during spring and summer the grass should be mown frequently and the grass clippings left as a mulch.

In cultivated areas the ground should be kept free of weeds by regular surface cultivation mainly for the same reason, to prevent competition for available moisture.

Manuring

To maintain good growth and fruit development annual dressings of fertilisers are necessary. These are best applied before spring growth begins in order to give the plant nutrients time to become available to the tree when growth starts. If this has not already been done, the application of fertiliser should not be delayed.

A complete fertiliser containing the three major elements, nitrogen, phosphate, and potash, should be used, as an unbalanced application may prove detrimental to crop production. Excess nitrogen, for example, will induce soft, sappy growth at the expense of fruit development; excessive potash may cause deficiencies in some of the minor elements necessary to a healthy tree. For the home orchardist the simplest combination of the three major elements is obtained by the use of blood and bone plus sulphate of potash. Blood and bone provides nitrogen in the form of dried blood, and phosphate in the form of bone dust, while sulphate of potash supplies the third major element.

Four parts of blood and bone and one part of sulphate of potash will make a satisfactory general orchard mixture. The amount which should be applied per tree varies, of course, with the size of tree and type of soil, but from 4 to 8 lb per tree is an average to good dressing for most bearing fruit trees. If it is desired to stimulate growth further during the season, an additional application of 1½ to 2 lb of sulphate of ammonia per tree in mid season will provide the extra nitrogen.

Warning on Use of Sprays

Many sprays, particularly insecticides, are toxic to humans. Every care is required when handling these materials.

The following precautions should be taken:

1. Store the materials in a safe place out of the reach of children.
2. Wear protective clothing.
3. Avoid smoking or eating during handling and spraying operations.
4. Thoroughly wash contaminated parts of the body, particularly the hands, immediately after spraying.
5. Destroy empty containers.

Protecting Bees

Insecticidal sprays are toxic to bees. **Do not spray with these materials when trees are in full bloom.**

Irrigation

Fruit trees require regular and adequate supplies of moisture throughout spring and early summer. In many places the rainfall is adequate, but when the monthly rainfall drops below 3 in. supplementary water should be provided. During dry periods the ground round trees should be given a good soaking at least every 10 days. Light sprinklings are of little value. The hose left running at the base of each tree for two or three hours at a time is the most satisfactory method.

(Continued at bottom of page 141)

APPLE AND PEAR SPRAY PROGRAMME

Time of application	Material	Quantity for 4 gallons of water	For control of
Buds showing green tip	Lime sulphur	1 pint	Black spot, powdery mildew
Petal fall	Colloidal sulphur (40 per cent)	2 oz	Black spot, powdery mildew
	plus lead arsenate ..	1 oz	Codling moth, leaf roller, pear slug
Subsequently, every 3 weeks until 1 month from harvesting ..	Repeat petal fall spray		Black spot, powdery mildew, codling moth
When sucking insects appear	add malathion ¾ oz to above spray ..		Wooly aphis, leaf hopper, mites

STONE FRUIT SPRAY PROGRAMME

Time of application	Material	Quantity for 4 gallons of water oz	For control of
At first swelling of buds	*Copper oxychloride	3	Leaf curl, bladder plum, shot hole
10 days later	Repeat		Leaf curl, bladder plum, shot hole
Late petal fall (usually when aphis first appears)	Malathion	¾	Peach aphis (leaves become curled)
3 weeks before harvest	Captan	1	Brown rot
Extra sprays			
If leaves become infected with rust ..	Captan	1	Leaf rust
If leaf roller caterpillar appears	**Add** DDD to captan	1	Leaf roller

* A substitute for bordeaux mixture. Those who prefer to use bordeaux mixture should apply it at 6 oz of copper sulphate and 5 oz of hydrated lime to 4 gallons of water.

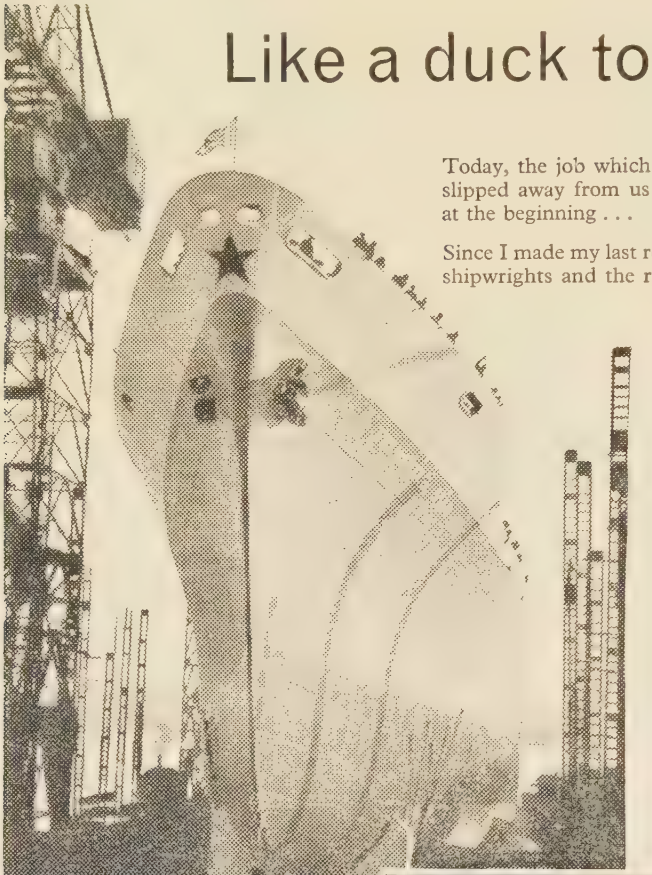
CITRUS SPRAY PROGRAMME

Time of application	Material	Quantity for 4 gallons of water	For control of
Petal fall of main crop (November) ..	*Copper oxychloride	3 oz	Verrucosis and other fungous diseases
December	Repeat		
Mid February	Summer oil	1 pint	Scale insects, sooty mould
Late May	Copper oxychloride .. plus summer oil ..	3 oz 1 pint	Brown rot Hard wax scale

* A substitute for bordeaux mixture. Those who prefer to use bordeaux mixture should apply it at 6 oz of copper sulphate and 5 oz of hydrated lime to 4 gallons of water.

NUMBER 3 IN A SERIES OF LETTERS ADDRESSED TO A SHEEP FARMER'S SON IN NEW ZEALAND

Like a duck to water, Tony!



Today, the job which had been occupying all our attention for months slipped away from us—and it wasn't any accident. But I'd better start at the beginning . . .

Since I made my last report, quite a change has come over No. 4 Slip. The shipwrights and the riveters have more or less disappeared and in their place came the painters. Then, bit by bit, the staging came down and, for the first time almost since we started work, you could see what we'd been working on. There she was—nameless still, but plainly a ship and a beautiful ship at that, a worthy addition to the Blue Star fleet which she soon will join.

Up by the bows they were building the special launching platform; and underneath the hull, men were busy with tallow and oil greasing the ways down which our ship would slide.

And then the day arrived.

On the roadways round No. 4 Slip the men who had helped to build the ship were gathered in little groups. The launching party, escorting the lady who was to christen the ship, picked its way through the yard and mounted the platform. After the turmoil of the last months, the scene was strangely quiet. Then we heard the thin crash and tinkle of breaking glass and, as the wine foamed down the bows of No. 1290, the clear voice of the ship's Godmother came over the loudspeakers . . .

"I name this ship **'FREMANTLE STAR'**—and may God bless her and all who sail in her".

The ship began to move. The scatter of cheering was lost in the crashing of timber and the rattling rush of the drag-chains as nearly 4,000 tons of steel gathered pace, slid swiftly down the well-greased ways and out into the broad waters of the river.

'FREMANTLE STAR'—a number no longer—was in her proper element at last.

So you see, Tony, your ship is well and truly launched. But she is still little more than a hollow steel shell and there's a lot more work to be done before she can be brought into service. But we're cracking on; and it won't be so very long before **'FREMANTLE STAR'** comes sailing into Napier to load New Zealand produce—including (who knows?) a consignment of your father's own hoggets!

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Jack for Drill or Topdresser

IT is often difficult to place a jack conveniently to lift the wheel of a drill or topdresser so that it may be turned by hand for cleaning out or adjusting sowing rates. A handy jack was devised for this purpose by T. F. Southon of Rukuhia Soil Research Station.

A LARGE-DIAMETER reject ball race is mounted on the end of a wooden arm by a metal strap. The arm swivels on a bolt through the top of two angle iron uprights welded to a base plate.

The ball race is slipped over the extending hub of the drill or topdresser wheel and when the arm is pushed down the wheel is raised off the ground. The arm engages on a hook which is held up by a small weight on the opposite end of a centrally pivoted plate. An iron stop welded across the uprights prevents the arm from pivoting too far.

Alternative holes are provided in both the arm and upright for adjustment of height and amount of lift.

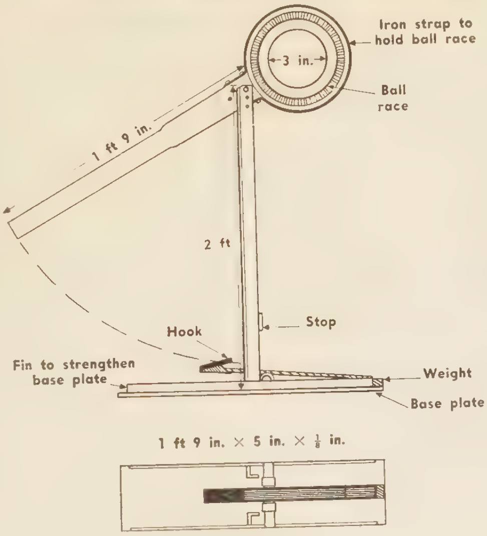
To lower the wheel, the arm is held firmly, the hook depressed, and the arm allowed to rise, thus lowering the ball race until the wheel is on the ground.

A lift of only 3 to 4 in. is required and the shorter the lift is the better will be the leverage. A nine-coulter drill or heavy topdresser can be lifted without strain.

The dimensions may need to be modified to suit particular implements.

If the front end of the jack is angled toward the centre of the drill, the jack will ride on a tapered hub.

The jack is of course satisfactory only on a machine which has protruding hubs.


Iron strap to hold ball race
3 in.
Ball race
1 ft 9 in.
2 ft
Stop
Hook
Fin to strengthen base plate
Weight
Base plate
1 ft 9 in. × 5 in. × 1/8 in.

The Home Orchard in Spring

(Continued from page 139)

With irrigation the water should be applied **before** the trees are showing signs of wilt or obvious water shortage. The need for irrigation is not gauged by observation but by checking the recorded monthly rainfall for the district.

If this is below 3 in., water should be applied regardless of the apparent good condition of the tree. Applied regularly and in advance of wilting, irrigation will allow the tree to develop without check, resulting in a bigger crop of better quality fruit.

Thinning

When crops are over abundant, some thinning of fruits is generally desirable. This ensures better penetration of sprays and allows full development of the remaining fruits. Apple clusters should be reduced to two fruits per cluster, and apricots and peaches should be spaced so that no two fruits are touching. The earlier this work can be done the better, and once the danger of a "shed" has passed, a preliminary thinning at least should be done.

Weed Control in Lucerne

THE first objective in establishing a weed free stand of lucerne is to ensure that the weed population, particularly of perennial weeds, is reduced to a minimum through efficient cultivation in the preparation of the seedbed. The time of sowing can influence the type of weed infestation likely in the establishing stage; autumn sowing favours ingress of perennial weeds that are fairly resistant to weedkillers whereas with spring sowing the weeds are usually susceptible annuals. For this reason and for better lucerne establishment spring sowing should be adopted wherever possible.

Lucerne can compete with moderate infestations of annual weeds, but heavier infestations should be sprayed with 2,4-DB when the lucerne is in the true-leaf stage and ground cover is complete.

Established Lucerne

Established lucerne is readily invaded by undesirable grass weeds, which reduce vigour and yield, and before any control of these weeds is considered any fertility deficiencies affecting the lucerne must be corrected. Chemical control of grass weeds is uneconomic in lucerne stands where the population of lucerne plants is not sufficiently dense to prevent re-infestation by grass or flat weeds.

In vigorous lucerne stands being invaded by grass weeds control can be effected by the application of dalapon in early spring when lucerne is beginning to grow. Such treatment at the rates recommended will check the yield of lucerne at the first spring cut, but the lucerne will recover for subsequent cuts.

Annual and Perennial Grasses

Annual grasses, such as barley grass, can be controlled with 2 to 3 lb of dalapon per acre. Perennial grasses, the most important being browntop, require 5 lb of dalapon per acre for control. Yorkshire fog is also controlled at this rate. Ryegrass and cocksfoot are more resistant and require 7 to 8 lb of dalapon per acre. At such rates there may be greater damage to the lucerne and it is doubtful if the elimination of these grasses is justified at present costs of application.

—*R. A. MILNE,*
Farm Advisory Officer,
Department of Agriculture,
Rangiora

Care of Livestock during September

By the Animal Research Division

CARE OF EWES WITH TWIN LAMBS

FOR the first month or six weeks of life the lamb depends almost entirely on its mother's milk. Ewes can produce more milk than a single lamb can drink in the early part of lactation, but twins can soon drink all the milk which the ewe can produce. For this reason ewes with twin lambs should be drafted off and grazed together on good paddocks. Separation is most easily done immediately after lambing.

DAIRY COW INFERTILITY

Examine mating records closely, especially during the fourth week of mating, to see if a problem is developing. If it is, it is time to consult your veterinary surgeon. Sterile bulls, mating cows too soon after calving, starvation, and the venereal diseases vibriosis and trichomoniasis are the main known causes of low conception rates.

ROTATIONAL GRAZING OF CALVES

Over 12 years at Ruakura well reared heifers have out-produced their poorly reared mates by an average of 21 lb of fat in the first lactation when both were well fed after calving. Frequent changes to good clean pasture are essential if calves are to be successfully reared. This rotational grazing avoids deaths in winter, eliminates the need for drenching against worms, and produces yearlings 100 lb heavier than those kept in the one paddock for weeks at a time. Further information on the rearing of dairy stock is contained in Department of Agriculture Bulletin No. 228, "Good Rearing of Dairy Stock".

FEEDING THE MILKING HERD

Autumn-saved pasture is almost equal to high-quality spring pasture as a milk-producing fodder. It should, therefore, be rationed to the milking cows to make it last until spring feed comes away and hardens. An electric fence is essential for efficient utilisation, enabling the pasture to be grazed in small breaks. Unless sufficient reserves of this pasture are available for full feeding, make up the balance of feed with silage. Make sure enough hay is retained to balance the lush spring growth.

When the autumn-saved pasture is finished rotate the herd round the farm. Keep paddocks small enough to maintain a concentration of 20 to 30 cows per acre. If necessary, subdivide larger paddocks with the electric fence. Aim at grazing pasture when it is 4 to 6 in. high, as it is then at its most nutritious stage. Do not keep cows in a paddock for more than one to two days. If necessary, clean up after them with dry stock.

CARE OF PIGS

Late-farrowed spring litters should receive special attention, since these will be approaching weaning age. Creep feeding is the secret of the heavy weaner and best results will be obtained by having a supply of meal and milk always before the litter. Weaned pigs must be well fed, and if meal has been used before weaning, its use should be continued for at least a fortnight to avoid an after-weaning check. The meal ration will be reduced as the skim milk supply increases. It is preferable to feed meal to weaners as up to half their daily rations and give the milk saved to the store pigs rather than feed meal to the older pigs at this stage. After weaning, sows should receive sufficient milk and meal to enable them to regain the weight lost during previous suckling. They should be hand mated and once safely in pig may be allowed to subsist on good pasture.

VACCINATION AGAINST SCABBY MOUTH

On farms where scabby mouth occurs each new crop of lambs should be vaccinated; this is most conveniently done at marking. If lambs are not protected, they are liable to suffer a severe check, as the disease makes eating very painful. The vaccine gives very good protection if properly used. Care is necessary to keep the needle prong clear of grease; if it becomes blocked, no vaccine is applied and lambs may still be susceptible. Ewes which have not previously been exposed to the disease should be vaccinated at the same time as their lambs.

EPIDIDYMITIS OF RAMS

Brucella ovis infection (epididymitis) is an important cause of ram wastage. An effective vaccine is now available for use by veterinary surgeons for the protection of rams against this disease. Young rams may be vaccinated at any age from four months until two months before the beginnings of their first tupping season. Vaccination as yearlings rather than at an earlier age will give better protection. Older rams should be examined by a veterinary surgeon and rams with clinical lesions of the disease culled. The remainder of the rams may be vaccinated either immediately or later at any time until two months before the beginning of the next tupping season.

MASTITIS

Mastitis is usually most prevalent in spring. Milk from all quarters should be carefully examined each day in a strip cup. If there is any abnormality, treat the quarter without delay, using three tubes of penicillin cerate at 24-hour intervals. Prompt treatment at this time of the year will greatly reduce the loss in production from light or dry quarters.

COCCIDIOSIS IN POULTRY

To prevent coccidiosis in chickens they must be kept growing steadily. Any check is dangerous. Cleanliness is very important, as the disease spreads through the soiling of food by droppings. If an outbreak occurs, sulphamezathine, sulphaquinoxaline, or nitrofurazone should be used in the drinking water or nitrofurazone in the mash. Full particulars of dosages may be obtained from Department of Agriculture Poultry Instructors.

WORMS IN POULTRY

Infestation by round worms is one of the most important causes of poor development of young birds. All growing stock should be treated twice with one of the powders or fluids now available for use in either mash or drinking water, once at three months old and again at five months old.

Seasonal Notes

By Farm Advisory Division

WINTER FEED CROPS FOR PIGS

THE provision of a feed crop to carry pigs through the winter is necessary to supplement available supplies of skim milk or whey. Because the pig has a simple stomach, it is unable to handle bulky fibrous feeds, so that a crop which can supply a well balanced diet, with least bulk and with high energy production, must be selected.

The highest energy producers are maize, cereals, and peas, followed by root crops such as fodder beet, carrots, swedes, artichokes, and mangels. Chou moellier, pumpkins, and marrows may also be grown. The final selection of a crop depends on its suitability to the particular locality and its digestibility and feed value.

With all crops, however, a protein-rich supplement such as meat meal, skim milk, or buttermilk powder also has to be fed.

One of the most popular crops in the dairying districts is fodder beet, since it combines high digestibility and feed value and has good keeping qualities in winter. Carrots are less popular because of the amount of hand work needed in the early growing stages. Swedes and mangels are less desirable because of the bulk which must be consumed before sufficient feed value is obtained.

The most popular fodder beet variety is Pajbjerg Rex, which is generally sown at 4 lb per acre in 28 in. drills with 4 to 6 cwt of superphosphate per acre. Fodder beet is pulled and fed out with the tops as required.

Annual weeds can be a problem in winter crops and considerable work is required in both weeding and thinning of the crop. Results of chemical weed control with pre-emergence treatments of TCA have been variable. Cropping in clean, well worked ground is far preferable to relying on chemical control of weeds.

Weeds in carrots can be controlled by kerosene, but the treatment is costly.

—*B. A. J. SMITH, Hawera*

* * *

SPRING-SOWN CEREALS

ON fertile land that is too wet for winter seeding the new wheat varieties Arawa and Aotea are giving satisfactory yields when sown during August and September at 2 bushels per acre with 1 cwt of superphosphate.

Barley gives best results on well drained loams of medium fertility. Though barley is frequently sown after a winter fallow after grass, it may also be grown after winter forage crops such as turnips or chou moellier. The main varieties, Research and Kenia, may all be direct headed provided ripening is even, but Research tends to lodge on heavy soils and is therefore recommended for areas where lodging is not likely to occur. The recommended seeding rate is 2 bushels per acre with 2 cwt of superphosphate and the date of sowing will vary with conditions from August to early November.

White oats may be spring sown at 2½ bushels per acre with 1 cwt of superphosphate after grass or a winter forage crop and do best on free loams where soil fertility is not sufficiently high to cause lodging. Windrowing should be carried out when the grain is at the advanced doughy stage and threshing with the header harvester should not begin until the grain moisture is reduced to 15 per cent.

Cultivation methods will vary with conditions, but the aim with all spring-sown cereals should be a moderately fine and well consolidated seedbed.

—*E. G. SMITH, Rangiora*

* * *

CONTROL OF BUTTERCUP IN DAIRY PASTURES

BUTTERCUPS are a problem in many dairy pastures which are pugged during wet winter conditions. The annual species celery-leaved buttercup (*Ranunculus sceleratus*) and small flowered crow-foot (*R. parviflorus*) can be controlled by the use of salts and amines of MCPA and 2,4-D applied before flowerhead formation at 1 lb acid equivalent per acre. Giant buttercup (*R. acer*) which is a perennial, is more difficult to control, but MCPB has proved quite effective. This material should be applied in the spring at 1 to 1½ lb acid equivalent per acre to control established seedlings. A second application should be made to control mature plants when they are just coming to flowerhead formation.

Effective control can also be obtained by mowing mature plants at flowerhead formation and spraying during the following autumn. Once the area is free of mature plants an annual application is necessary to control seedlings. Before a pasture is sprayed it should be grazed as closely as possible to reduce clover leaf and the possibility of damage to established clover plants.

—*B. A. J. SMITH, Hawera*

* * *

BETTER SILAGE FACILITIES

WASTAGE of conserved material is poor return for hard work and expense. Oxidation by air, overheating, and the leaching of nutrients all lead to losses.

This wastage can be markedly reduced by the provision of better storage facilities. The trench built through a hill or a pit dug into the side of a rise will provide protection to the sides and improve consolidation of the ensiled material. Such silos are much safer to work over with a tractor and require little labour for stacking.

On flat country where open clamps are usually built wastage can be greatly reduced by provision of walled, bunker-type silos built above ground on well sited and well drained areas. Well planned silos are easily filled, can be consolidated safely, and may later be fed out systematically. Covering the silage with sawdust, polythene, or roofing to shed rain clear of the sides will further reduce wastage.

The tilt-up construction of concrete silos has simplified the lining of slumping trenches and pits. These silos can be readily built with available farm labour at reasonable cost because boxing and form work have been practically eliminated.

The speed of turn-round at a well sited and properly designed storage facility reduces expensive labour and moves a step nearer to one-man silage making and handling by complete mechanisation.

—*J. L. DOUTRE, Auckland*

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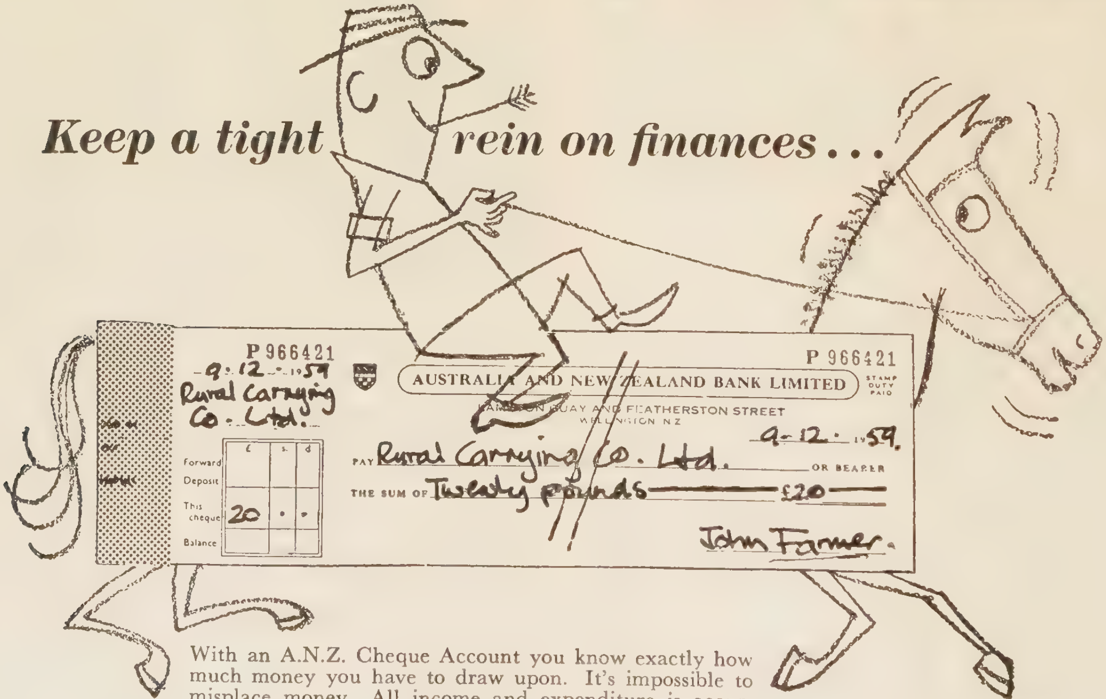
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"Journal's"

50th Jubilee Supplement 1910-1960

50 Years' War on Animal Pests

THE term noxious has been applied to unwanted plant growth for many years, but only recently has it been used to describe animals which, because of their habits and rapidity of increase, are a danger to farm production or natural resources. Already a great amount has been written on the subject and some have even hoped that we might have the opportunity of restocking New Zealand. How many plants we would exclude and with what care would we select the animals we introduced! Hunters would have to go far afield in pursuit of deer, thar, or chamois; the wild pig would never root in the bracken patches; the opossum and the wallaby would remain the property of our trans-Tasman neighbours to the benefit of our forests and hill pastures.

RABBITS

The Most Destructive Pest

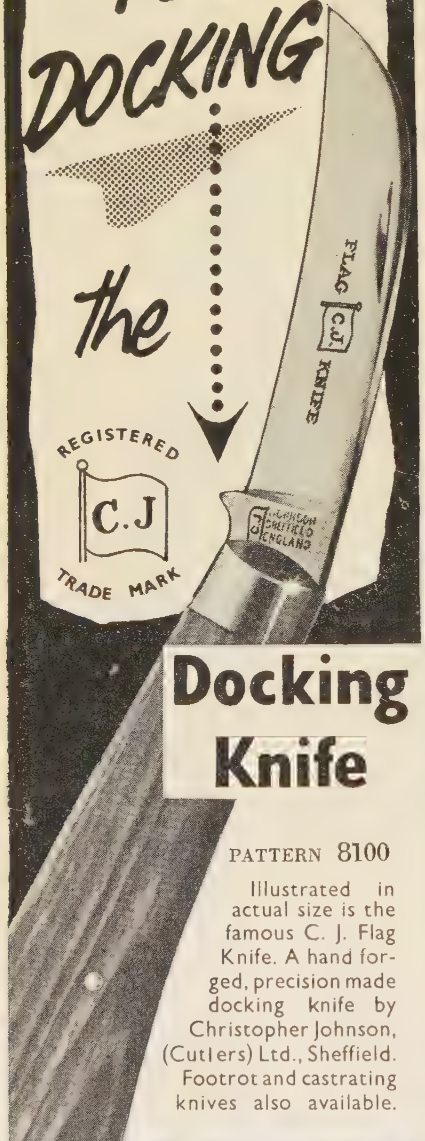
By J. P. SHENNAN

THE greatest destroyer of all, the rabbit, by his absence would ensure that native pastures on our hills and mountains and our farm crops as well were free from one of their greatest limiting factors. But these are vain imaginings; the rabbit pest has been an only too solid reality for 90 years. When the first "Journal" article on the subject was printed in January 1912 losses from this cause were already tremendous. If E. Clifton, Chief Inspector of Stock, who wrote the article, was able to survey the scene today he could justifiably be proud of his pronouncement, for he said:

The rabbit nuisance continues. On country where it is simply dealt with as a nuisance effective control is maintained. This comparatively satisfactory position does not apply where trapping for export is in favour. This business has assumed large proportions: the rabbit is preserved. Some landowners demand a royalty or charge from trappers

STILL THE FAVOURITE FOR DOCKING

the



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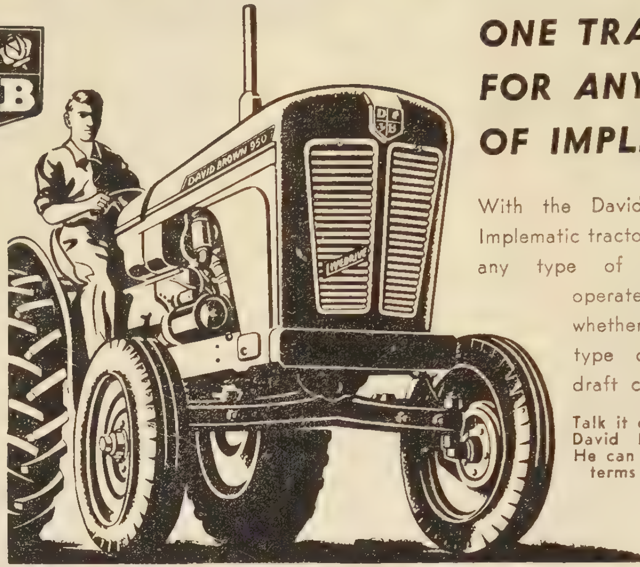

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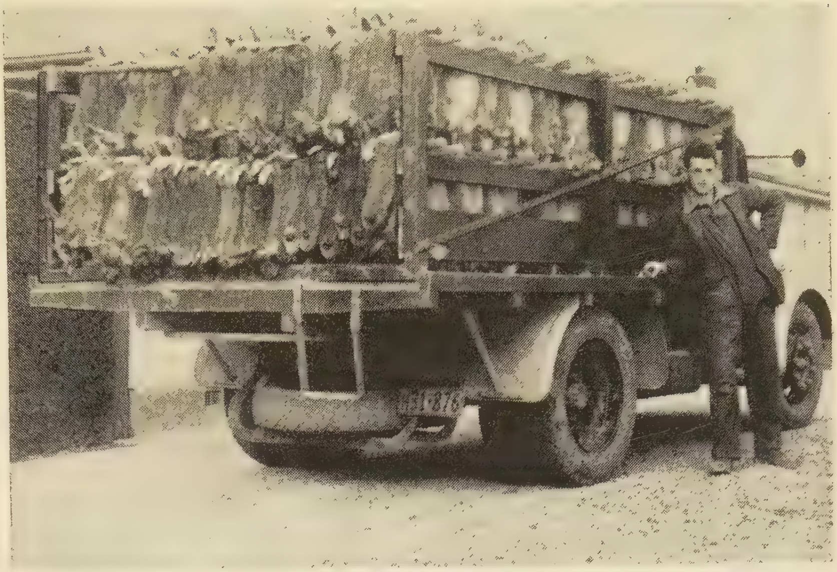
> for the privilege of exploiting their country. It is assured that so long as the rabbit is permitted to be considered marketable for export its number will not be effectively diminished. This system of trapping for export extends over a large area of country. The interests in trapping occupy the attention of many people. The trapper, the landowner, the storekeeper (who usually is the financier of the trapper), the carriers (who collect from the trapper and transport the rabbits to the railways), the merchant (who supplies the storekeeper), the freezing-works, and the shipping companies are all concerned. These interests are incompatible with effective control of the pest. There are many representations made that this industry—for such it is—should not obtain the support and sympathy of the farmer. It is probably unavailing to represent that the crucial point is, which is the more remunerative to the community, the livestock of the farm and the crops, or the exploitation of the rabbit as an article of export? There cannot be stock and crops of the farm as well as the rabbit, and both be profitable. The one lives at the cost of the other.



Truck loads of trapped rabbits were a common sight in New Zealand for many years before legislation enabled stage by stage decommercialisation of both skin and carcass of the pest, which was completed in 1957.

This admirable assessment of the situation could have been repeated annually with complete truth over most of the succeeding years until the passing of the 1947 Amendment to the Rabbit Nuisance Act.

Rabbits for Profit

In 1912 commercialisation of the pest was firmly entrenched. Trapping of rabbits to control or exterminate them had been repudiated by all people competent to judge, but ready cash had an irresistible appeal to back-country farmer, farm worker, and merchant alike. Furs and meat were salable in times when markets for all farm products were limited. It was of little avail for experienced men like H. Munro, Inspector of Stock, Wellington, to write in October 1917:

> The rabbit trapping and export industry can only flourish in districts where rabbits are so numerous as to constitute a menace to the agricultural and pastoral industries, and it is not in the interests of those connected with the industry that rabbits should be exterminated or their numbers reduced below a certain limit on any country from which they are able to draw supplies. It therefore follows that the existence of such an industry in any district instead of being an assistance is an obstacle to the extermination or proper control of the pest. The manpower which is employed in the industry represents some of the best unskilled labour in the Dominion, and it could be much more profitably employed in some other way. In order to be a successful trapper a man requires to have energy and initiative, and as men possessing these qualities can earn good money at trapping, that industry secures their services. The wages of the trappers depend solely on the number of rabbits they are able to catch, consequently they will continue to work on a block of country only so long as they are able to earn a good wage, and when no longer able to do this they will move to a fresh block where the rabbits have again become numerous as the result of a few months' rest. The number of rabbits left on country where a trapper is no longer able to earn good wages is always ample to enable such prolific breeders to again become numerous in the course of a few months if other means of destruction are not adopted in the interval. The business of men trapping rabbits for the industry is to kill, so far as possible, only what is suitable for the market, and the destruction of the young rabbits, which are not suitable for that purpose, is directly opposed to their interests.

Several alternative methods of destruction were advocated. The June issue of 1912 included a description of the use of carbon bisulphide for destroying rabbits in their burrows and detailed the experience of Mr. R. M. Paterson of Ayrburn, Arrowtown, who practically cleared his farm by this method.

Poisoning with phosphorus mixtures had been successful for many years and was widely used both in Australia and New Zealand. Later strychnine used with oats, carrots, grain, and jam very largely displaced phosphorus as a killing agent, as the rabbits died close to the poison line and skins were recoverable.

The "Journal" for November 1919 contained an interesting article "Hints on Rabbit-Destruction" by J. J. Fiven, Departmental Rabbiter, Tophouse. Some of these are worth quoting:

> Boundary fences should be wire-netted and free from holes. Wooden stays should not be used for straining posts, as they are readily climbed by rabbits. For the same reason, twiggy bushes should be cut back from the fences. If possible, net subdivisions.
>
> Be sure that the person who is mixing the poison thoroughly understands the work; also that everything used in connection with the poison is kept perfectly clean.
>
> Avoid employing a rabbiter who tells you it is lost effort and time to carry and use a spade. The policy of "If I don't get the rabbit today, I will get him tomorrow" is out of date.

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Don't use large packs of dogs, as they only keep your country in a state of unrest; always try poisoning first before attempting other methods of destruction.

Poison Still Best Weapon

Methods in use then have been modified, but are largely the same today. Poisons are still our best weapon. The use of arsenic is described in an article by H. T. Turner, District Inspector, Christchurch, in April 1921. It did not come into general use then, as rabbits died away from poison lines and few skins were recovered. Later in Rabbit Board hands arsenic completely displaced strychnine.

It, in turn, has been superseded in many areas by the most effective poison yet introduced, sodium monofluoroacetate ("1080"). The use of calcium cyanide as a fumigant is described in the May 1924 issue. This material in its many commercial variants is still an effective weapon.

An interesting commentary on the state of native plant life in Central Otago might be drawn from an October 1925 article on the use of strychnine on thistle roots. Nothing being available above ground, the rabbit had, perforce, to scratch the earth from around thistle roots. A little strychnine added to this spartan diet had the desired results.

Control Legislation

Legislation to control rabbits had been introduced as early as 1876, when the first Rabbit Nuisance Act was passed. This enactment was altered and amended in 1877, 1880, 1881, 1882, and 1890.

The power to form Rabbit Districts was given in the first Act, but was largely ineffective, as there were no provisions for financial assistance.

Powers granted to Inspectors appointed under the Act were very wide, but were curtailed in an amendment passed in 1901.

These powers were restored in 1918 and are outlined in an article in the January 1919 issue. Section 2 (1) of this Amendment read:

> After service on the owner or owners of any private land of a notice under section six of the principal Act (requiring the immediate destruction of rabbits on that land) it shall be the duty of the owner or owners on whom such notice is served forthwith to commence and thereafter to continue to do to the satisfaction of the Inspector all such acts as in the opinion of the Inspector may be necessary to destroy within the shortest time possible all rabbits that may be on the land mentioned in the notice, and any owner who makes default in so doing shall be liable to a fine of not more than one hundred pounds.

Those few words "to the satisfaction of the Inspector" gave him power that could not be disputed. They were the source of much ill feeling, particularly as they ushered in an era of increased pressure on landowners to reduce rabbit numbers. This power was subsequently removed, but it had the effect of hastening the formation of new Rabbit Districts in many places.

Prohibition of Trapping

After many years of criticism of trapping as a mean of control, power was given Rabbit Boards in the 1920 Amendment to the Act to prohibit trapping in their districts. This is referred to briefly in the November 1922 "Journal", when the Hurunui Rabbit Board had the necessary regulations gazetted. In part they read:

> Not later than seven days after the service of such notice [to destroy rabbits] on an owner of land all trapping on his land shall cease, and thereafter for a period of three months from the date of service of the notice the owner shall not, except with the written permission of the Board and subject to the conditions specified therein, trap rabbits or allow rabbits to be trapped on his land.

Success of Rabbit Boards

The 1908 Report of the Department of Agriculture had mentioned the success obtained by the Hawke's Bay Rabbit Board, but it was not until

[*National Publicity*

Young rabbits dug out from their burrow. In 1919 the "Journal" advised farmers to "avoid employing a rabbiter who tells you it is lost effort and time to carry and use a spade. The policy of 'If I don't get the rabbit today, I will get him tomorrow' is out of date".

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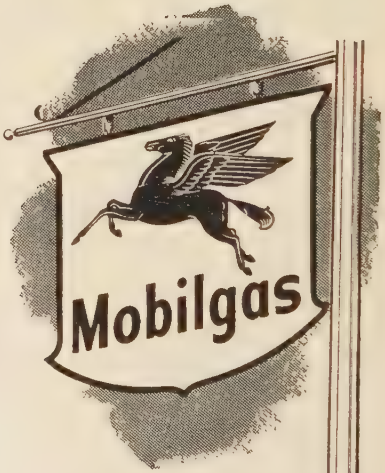

November 1926 that a similar report on good work by Rabbit Boards was quoted in the "Journal":

> Efforts towards the destruction of rabbits have been waged with unabated energy, but, notwithstanding all the efforts put forth and the seemingly satisfactory position attained at the end of winter, the young rabbits again quickly show themselves, and the fight continues as an ever-recurring struggle. . . . Rabbit Boards continue, with few exceptions, to do admirable work, and the condition of the pest in the North Island, where considerable areas are now controlled by Boards, continues to be satisfactory, demonstrating that rabbits can be effectively controlled when the cooperative spirit is dominant.

The work of the Rabbit Boards was again reported on favourably in October 1927 and October 1928.

The depression which followed did little to encourage rabbit destruction and areas outside Rabbit Districts soon deteriorated.

The 1930-31 report of the Director of the Livestock Division was quoted in the November 1931 "Journal" as follows:

> The control of rabbits during the year has given some concern, and although good work has been done in many districts there are no doubt some localities where the incidence of rabbits is less satisfactory than in recent years. This position is due to the seasonal conditions enabling rabbits to breed up quickly during the spring and summer months, together with low prices for furs and the financial depression which placed many settlers in the position of being less able to pay for the usual suppression methods. For several years prior to this one the high price of skins induced a considerable number of experienced rabbiters to engage in the work of rabbit destruction with little or no cost to the landowner, but early in the present season the value of furs receded to a point where the collection of skins ceased to be a payable occupation. Rabbit-control work at once became a direct charge on the landowner at a time when very few of them were in a position to employ extra labour. . . . Rabbit Boards have, without exception, carried out their work in a satisfactory way, and rabbits in their areas are well under control. Under localised Board control the work goes on systematically throughout the year, and the conditions in the various areas under their jurisdiction are striking evidence of what can be done by systematic operations and continuity of effort.

This contrast between lands in Rabbit Districts and those outside, combined with the gradual evolution of what came to be known as the "killer policy" of boards, led to the formation of more and more Rabbit Districts. In the next few years much of Southland, always heavily infested, was covered by Rabbit Districts.

During the depression years subsidised labour was made available for rabbit destruction. This scheme was extended in 1940, and the November "Journal" of that year outlined the Rabbit Control Subsidy provisions which entitled boards, county councils, or individual farmers to collect up to £3 10s. per man per week for rabbit destruction work.

> The scheme has been devised in order that rabbit destruction work may be continued with unceasing

Laying phosphorised pollard (circled) in a rabbit-infested area. Poisoning with phosphorus mixtures was successful for many years and was widely used, but later strychnine largely displaced phosphorus, because with strychnine the rabbits died close to the poison line and the skins were recoverable. In Rabbit Board areas strychnine was later displaced by arsenic, which in turn was superseded in many areas by the most effective poison yet used, monofluoroacetate (1080).

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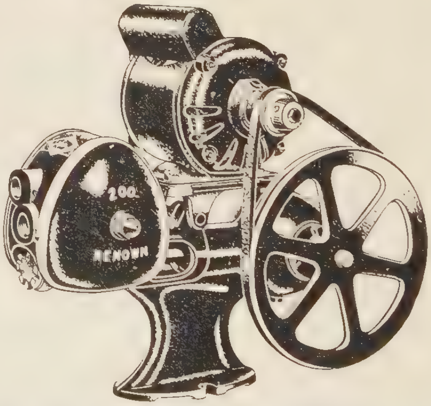

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energy throughout the spring, summer and early autumn months, and not be confined to a few months in the year when the price of rabbit skins is the chief consideration.

Many will remember the rapid increase in the rabbit population which took place during and after the Great War, and, although the position today compares more than favourably with that period, there are indications of serious trouble ahead, particularly in some southern districts, if adequate organised destruction work is not undertaken.

Announcing the continuation of this scheme in October 1941, the "Journal" stated:

> The subsidy scheme will be available to rabbit boards, county councils, committees of farmers, or, where no committees can for good reason be formed, to individual farmers, but it should be quite clear that the essence of its adoption implies the prosecution of an energetic "killer" policy, and this aspect of the scheme will be made of paramount importance. With the introduction of this scheme of liberal assistance, any slackness of effort in the destruction of rabbits during the next few months will bring the defaulters under the penalty provisions of the Rabbit Nuisance Act.

Important Legislation of 1947

The increase in rabbit numbers during the war years, duplicating a similar increase through the 1914-18 period, further emphasised the good results being obtained by Rabbit Boards. District Councils had been set up in both Islands and their combined experiences and consultations led to the legislation of 1947.

> **Few enactments put on the Statute Books of New Zealand have had such far reaching results in increasing farm production as the 1947 Amendment to the Rabbit Nuisance Act.**

As outlined in the February 1947 issue of the "Journal" it provided for the setting up of the Rabbit Destruction Council with powers to recommend increased financial assistance to boards. It also legalised the "killer" policy and gave wide powers to the Minister of Agriculture for the constitution, alteration, amalgamation, or abolition of rabbit districts.

1955 Act

With the passing of the Rabbits Act 1955, which was in the main merely a consolidation of the previous Amendments passed without mention in the "Journal", and an Amendment in 1957 our legislation on this troublesome visitor rests. Minor amendments have been made, but they have not altered the main provisions of the Act.

The way was opened up for devaluation of the rabbit, which has been achieved. Total coverage of New Zealand with Rabbit Districts is on the way, and elimination of the pest the next objective.

[*Australian Official photograph*

Australian scientists injecting myxomatosis virus into a rabbit to determine the disease's effect. Though myxomatosis was spectacularly successful in reducing rabbit numbers in Australia, in New Zealand it had only a slight success in the first year; subsequent tests gave negative results and in 1953 it was concluded that the disease was unlikely to be of great value in controlling rabbits in New Zealand.

Myxomatosis a Failure Here

A failure which is now regarded as a blessing in disguise is noted in the November 1953 issue. Myxomatosis, spectacularly successful in reducing rabbit numbers in Australia and Europe, was introduced by the Animal Research Division and tests were carried out at numerous points throughout New Zealand by Animal Industry Division officers. Some slight success was noted in the first year, but subsequent tests were negative. In reporting these trials J. F. Filmer said:

> The results of the 2 years' trials with myxomatosis in New Zealand have been disappointing. Although natural transmission occurred in some areas and achieved a local reduction in rabbit population, in no district did the disease spread far from the trial site. The disease did not appear to persist through the winter in any area in either year. Reasons for the failure to spread are not readily apparent. In some areas mosquitoes and sandflies were plentiful during the trials, and, as has been indicated, some natural transmission occurred.
>
> It is considered that the disease was given a fair trial in a number of widely distributed rabbit-infested areas, and it therefore seems unlikely that myxomatosis will prove of great value in controlling rabbits in New Zealand.

Our final reference is in May 1956, when I. G. McIntosh, Animal Research Division, contributed an article on the dangers of rabbit poison baits to livestock. There is a link with an earlier quotation in this article, for McIntosh introduces his subject thus:

> In New Zealand poisoning is the most important weapon in rabbit destruction.

Nothing in the last four years has contradicted that statement.

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WILD PIGS

THE introduction of the pig and the potato was of immense benefit to the Maoris in early settlement times. Unfortunately the pig has a propensity for "going bush" if left to his own resources, and "going bush" he has been ever since. His ability to increase rapidly, his rooting of farm land, and a tendency to develop a taste for young lambs have made him unpopular in localities where the terrain suits him.

THE "Journal" of November 1925 under the heading "Destruction of Wild Pigs" quotes:

> The State Forest Service "Newsletter" for September states: "During the lambing season the stream of claims for payment of royalty on wild pigs killed has been heavy and continuous. We are now operating over the whole of Taranaki, the Wanganui River locality, and the Ruatiti-Raetihi locality, between the Main Trunk line and the Wanganui River. Some twenty prominent settlers in convenient locations act as collectors of snouts on behalf of the Service, and are periodically visited by the District Forest Ranger".

Pig hunting is a popular sport and the subsidy claimed for snouts and tails assisted in buying ammunition.

Poison Recommended

These efforts were seldom sufficient to keep the pig under control, and poisons have been developed to provide a more efficient service. G. R. Mackintosh, Stock Inspector of Taumarunui and later of Hamilton, contributed three articles on the poisoning of wild pigs. The first of these articles in April 1941 described the use of phosphorus. His opening remarks outlined the need for a pig-poisoning campaign:

> Losses amounting to many thousands of pounds are caused annually in many parts of New Zealand by the wild pig. It is difficult for one who has little knowledge of the wild pig to realise the enormous amount of damage caused by it. Hundreds—if not thousands—of acres of good hill pasture are annually rooted up as if the land had been thoroughly ploughed. . . .

Although the greatest loss is due to rooting, substantial losses result from lambs being killed during the lambing season, broken and insecure fences, time spent in hunting the pest to the detriment of other farm work, and dogs lost or spoilt in hunting. The cost of fencing materials, seed, ammunition, etc., has to be sustained by the farmer and may often turn a profit into a loss.

Good Results with Poison

Mr Mackintosh's advice was continued in the April 1944 issue and described the use of a phosphorus and carbon bisulphide mixture as well as phosphorised pollard. The results obtained by the Kaitieke County Council were so good that similar methods were successfully adopted in other districts.

In March 1950 Mr Mackintosh concluded his contribution on this subject. By this time the special mixture was available from the Departmental poison depot at Frankton.

Similar methods have been used in many districts, including South Otago, where a cooperative organisation of local farmers has succeeded in reducing pig numbers to a very low level.

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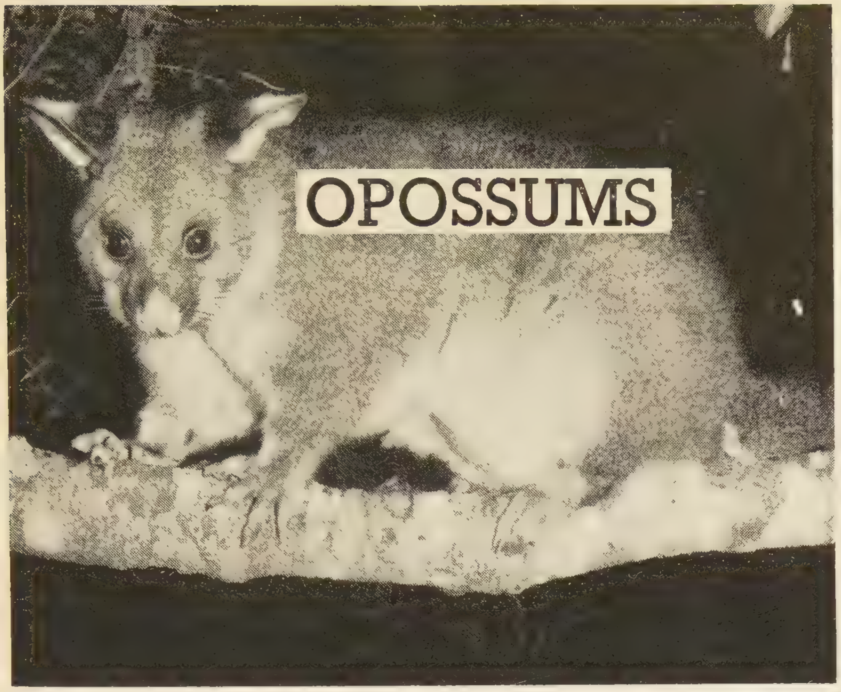

[New Zealand Forest Service

← The opossum was introduced by responsible organisations with Government approval and for many years trapping of it was rigidly controlled, but because of the damage it causes the animal is now considered by many to be the country's worst pest and it is no longer protected.

UNLIKE the rabbit, the opossum was introduced and protected by responsible organisations. His protection was firmly supported by those in authority and his value as a producer of revenue widely upheld.

IN view of the present situation, the first reference in the "Journal", in June 1919, is worth quoting in full:

> At the last meeting of the Board of Agriculture a report from the Crown Lands Ranger, Dunedin, on a proposal of the Otago Farmers' Union that opossums might be liberated in some of the forests of the great alpine range was carefully considered. It was finally agreed that this might prove a considerable source of revenue to the country (as black skins were said to be worth £1 each) if the black or brown ones were introduced, and if every care was taken to prevent their introduction into districts where they might become a menace to the fruit-growing industry.

In June 1920 we read:

> At the annual meeting of the Wellington Acclimatization Society, held last month, the president expressed the opinion that an opossum season should be opened under licence in suitable districts. Professor H. B. Kirk had gone into the whole question very fully. In a fruit district the opossum should not be protected, but in native bush they did no damage. . . . The conclusions of Professor Kirk were that opossums did do damage to orchards, and in fruit districts there should be an open season perpetually. Although plantations were liable to suffer, the native bush did not suffer appreciably, and might be heavily stocked. The opossum trade was valuable, and might be made more valuable still by development. Licences should be issued to trappers, and the mountain ranges should be stocked with the best Tasmanian brown opossums.

It must be admitted today that even the "best Tasmanian brown opossums" are unwelcome, and the native bush is definitely suffering appreciably.

Another reference strikes a different note. A correspondent in the April 1924 issue asked for advice:

> I am pestered with hares and opossums, and would be obliged if you could advise me how to get rid of them so as to be within the law. I have an orchard, and the loss is very serious, as they strip the trees of nearly all the fruit, break boughs, etc. My boundary fence is adjoining the bush.

As hares must have been implicated in a very minor degree, the reply on opossums only is quoted:

> The Animals Protection and Game Act 1921-22 allows opossums to be taken at any time without licence in any orchard registered under the Orchard and Garden Diseases Act 1908, or within half a mile thereof, by the occupier of such orchard or by any bona fide employee of the occupier. All skins so taken and which it is proposed to dispose of must be stamped by an authorised officer and a royalty of 1s. paid thereon within one month from the date on which the skins were taken. No person may dispose of opossum skins for gain unless sold to or by a licensed broker. Skins retained for a person's own use must also be stamped and a royalty of 1s. paid thereon within one month from the date on which such skins were taken.

In the period before the next reference the villain is unmasked, and the April 1949 issue states boldly:

"Control of Opossums an Urgent Problem"

> Control of opossums is now a pressing problem in farming and orchard districts, in exotic and protection forests, and even in home gardens. In the hope that it will encourage greater interest in the trapping of a serious pest two articles covering all the aspects of opossum hunting have been compiled by L. T. Pracy, Field Officer, and R. I. Kean, Biologist, Wild Life Branch, Department of Internal Affairs. Because it is felt that insufficient knowledge of the behaviour of the animal itself may deter some, particularly young farm workers, from attempting trapping, this article deals fully with the life history of the opossum, its habits, and its food preferences. A second article will discuss trapping and general methods of control, skinning, and care of skins.

The second article on methods of control appeared in the next month's "Journal".

These are the brief references in the "Journal" to an introduced pest that is rapidly taking the place of dishonour as animal pest No. 1. We shall, without doubt, have more to say about him in future "Journals".

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K. Nelson

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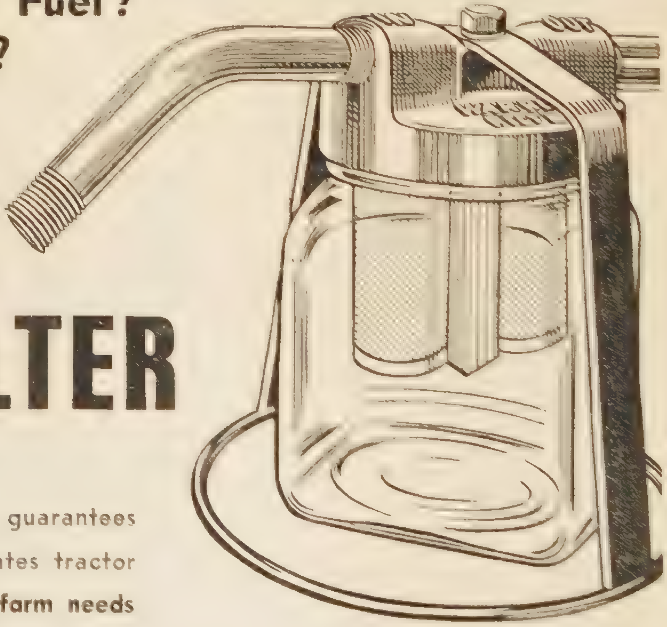

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DEER

It was only with considerable difficulty and after several importations that some animal species were established in New Zealand. Deer, however, soon settled down in their new environment and provided excellent trophies for stalkers. It was not many years before it became necessary to supplement the efforts of private stalkers and the "Journal" of December 1920 quotes a report of the Forestry Department thus:

> deer have become a serious nuisance in the plantations, and though forest officers are permitted to shoot them in the plantations it is both difficult and expensive to keep these pests in check. Dr Sommerville has shown that in the Scottish Highlands deer have in many localities, by eating the seedlings, completely prevented the regeneration of Scots pine. These animals are likely to become a serious trouble in our own native forests as soon as management operations are started in them, and it will be necessary to take strict measures to control them.

Seven years later the same month's issue refers to the lordly stag in far from complimentary terms in quoting from the State Forest Service annual report:

> All [forest] conservation regions report an increase in these vermin, and this Service again places on record its opinion that protection on all species of deer (except moose and wapiti) should be removed for a period of at least three years, and that payment of a bounty on killed deer should be continued during that time. Protection has been removed from this pest on the State plantations throughout New Zealand, and during the latter part of the period under review the Service inaugurated a campaign for the destruction of deer on these areas. This included the payment of a bounty of 2s. per tail on all deer killed in plantations, the carrying out of poisoning experiments, and the establishment of salt licks for the purpose of attracting deer to places where they might be easily shot. Forest Service officers acting as receivers of deer tails for the payment of bounty report the collection of 2,946 tails, of which 2,001 tails were received at Tapanui from the vicinity of the Blue Mountains, Otago.

The "Journal's" final quotation is 30 years old. It might be repeated this year and be equally true. The Director of Forestry in his report for 1928-29 said:

There is no doubt that at the present time deer constitute the most serious menace to the State-owned forests, and in consequence of their great numbers the forest floor has in many places been completely destroyed. In many parts of New Zealand regeneration has disappeared, and the plants which furnish most of the honey and berries upon which native birds subsist have been completely destroyed. Deer destruction has not yet overtaken the annual increase of the herds; malformation is prominent, and good heads are not obtainable in many districts.

Probably the damage is most apparent in high country, above the bush line. The major alpine plants are obviously a staple diet, and the formation of screes at the headwaters of snow-fed rivers is accelerated and increased in area by the removal of this vegetation. Increased erosion and larger deposits of detritus on low country are the direct result. The true remedy for much of the present high-country erosion, particularly in Canterbury, is afforestation with high-altitude species for protection purposes. This remedy is quite impossible of application in deer-infested country, as the young trees are immediately eaten out.

Notwithstanding the efforts made by some of the acclimatisation societies to control this pest, it has reached such proportions and constitutes such a grave danger to the perpetuation of our native flora and fauna that it is now a national problem and should be nationally controlled.

Looking to the Future

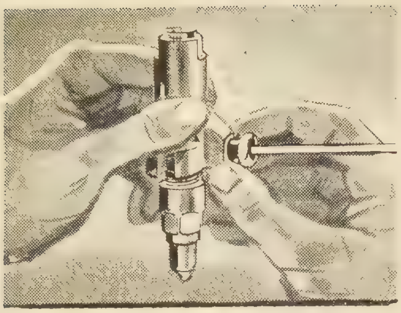
It is our privilege to live in a land admirably suited to all types of temperate zone farming. Much has been done to improve pastures and stock. Much of the fertility which was depleted in the earlier years of settlement has been restored. Lands which were naturally inhospitable and infertile have been brought into production.

It is to the credit of farmer, scientist, and extension worker that plants and animals introduced over the years have been adapted and improved in our environment.

Our failure to deal adequately with our mistakes in plant and animal introduction has cost us dearly and continues to limit production over wide areas.

We must see to it that unwanted animals are at least reduced to such levels that they no longer menace our resources, natural or exotic. Where they can be eliminated this should be our objective.

Photograph by New Zealand Forest Service.



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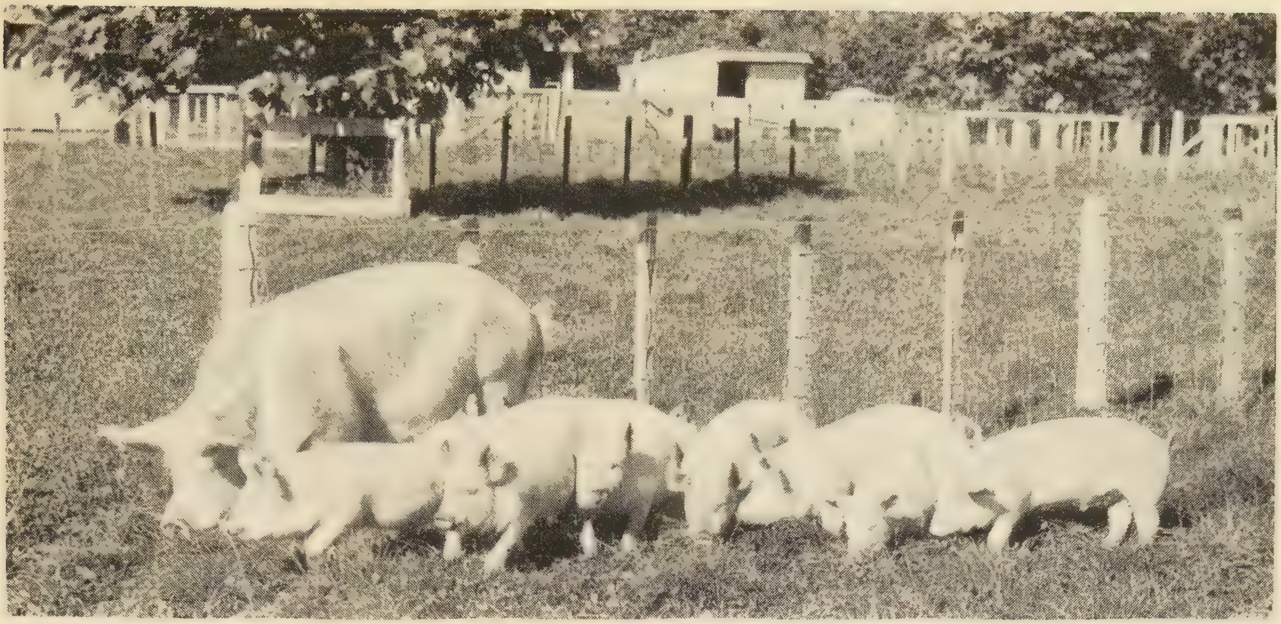

PIG HUSBANDRY through the "JOURNAL"

By A. LONGWILL

IN New Zealand pig keeping has been developed largely as a sideline to the dairy industry. A fairly good picture of how this relationship has varied over the years is obtained by following the ratio of total pigs to dairy cows in milk.

IF we go back to the end of the last century, when the dairy industry was just beginning to get established, we find that this ratio was very close to unity, 1 : 1.1 in 1896. As the industry developed and dairy cow numbers grew so did pig numbers, but at a proportionately lower rate. In the 20 years to 1916 dairy cow numbers trebled, but pig numbers increased only by 60,000 or about 25 per cent, though they had been up to 350,000 (an increase of 38 per cent from 1896) before the First World War.

The slump after the First World War gave something of a boost to pig production and with the advent of the New Zealand Meat Producers Board and encouragement of exports the ratio of pigs to dairy cows remained constant for some years at 1:2.5.

Toward the end of the 1920s the stimulating effect of the slump in butterfat prices began to take effect and during the worst depression years of the thirties pigs often made all the difference between "sink" or "swim", and the pig population reached a peak in 1936. Production was held at this relatively high level until the early years of the Second World War, but slumped when uncertainties in regard to carcass requirements, shipping, etc., became acute and labour on the farms short. Though the decline in production was arrested at the end of the forties, recovery has been slow and complicated by large scale diversification of dairy product manufacture.

The "Journal's" service to the pig industry faithfully reflects these changes of emphasis. In the first decade of publication only four articles giving advice on pig management appeared, though Volume 1 recorded that two sows and a boar (Berkshires) were selected for export to the Cook Islands.

Sound principles of husbandry do not become outdated, though their interpretation may be revised by each new generation in the economic situation in which it finds itself. This is borne out by recommendations made in some of the early articles.

For example, stress was laid on the importance of sow management "as the factor on which success or failure in pig keeping largely depends". In this connection the selection of breeding stock in relation to growth ability was mentioned. A specially designed farrowing house incorporating farrowing rails and a creep was advocated, as was weaning at six to seven weeks.

One is reminded of the need to push forward with T.B. eradication in dairy herds when one reads in 1911 advocacy of **pasteurised** separated milk as

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HEADING PHOTOGRAPH: National Hybrid sow and litter. The National Hybrid was developed to provide more prolific and hardy breeding stock.

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by SKELLERUP

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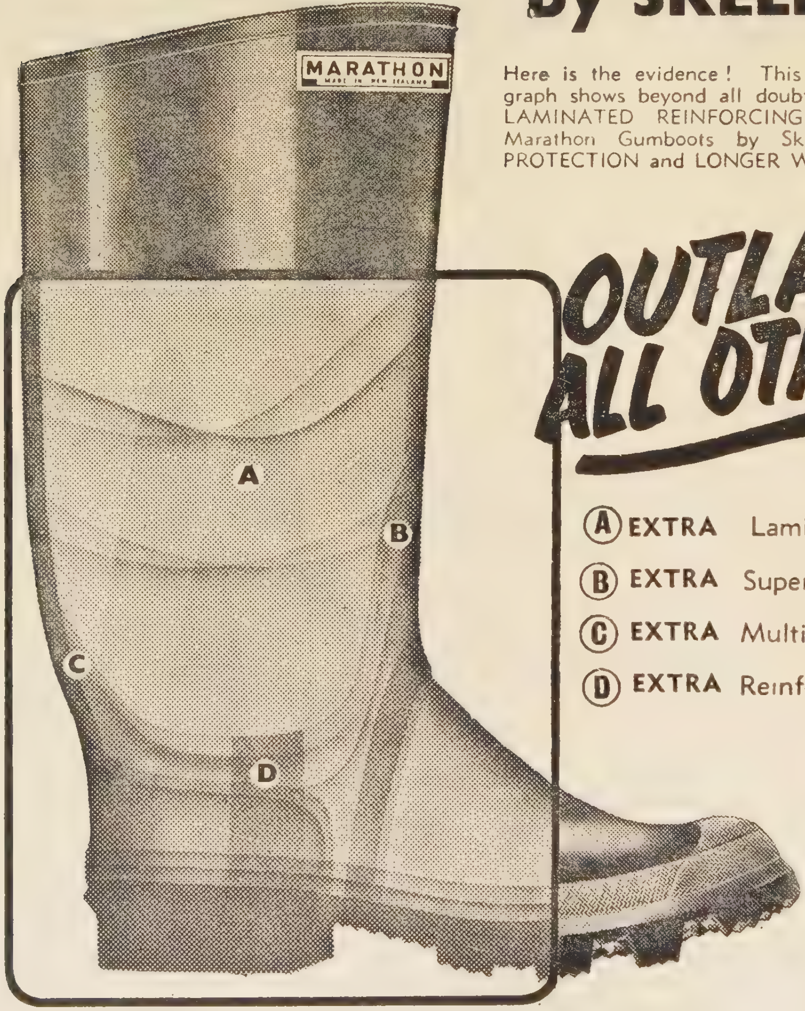

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the basis of pig diet ". . . with a liberal allowance of pollard, corn, or barley meal and perhaps a small quantity of peas or beans, if practicable".

It was observed that "porkers are more profitable to the farmer than baconers," and though the price paid to farmers for the two classes is not mentioned, this position still obtains unless the price paid shows a premium for baconer weights. One is forced to reflect that a great deal of research in recent years has gone into proving how sound these early recommendations were.

A statement that ". . . contrary to the belief of some pig keepers, the pig is naturally a clean animal in its habits and deserves more humane treatment than is often meted out to it" has frequently been repeated in various forms in the intervening years.

Specialist Instructor

In 1920 the first appointment (of K. W. Gorringe) as Instructor in Pig Keeping was made. Gorringe had practical experience in Taranaki and Waikato, and his advocacy of an open paddock layout, as the best means of capitalising on New Zealand's climatic advantages, and regular rotation, to couple sanitation with the raising of crops for pigs, soon established a pattern for pig husbandry that endured at least until the early thirties.

In the first half of the twenties low prices for dairy produce due to the post-war depression kept pigs on the increase at the same rate as dairy cows. Later in this decade pig numbers remained fairly static while dairy cows continued to increase faster—a trend which persisted until after the outbreak of the Second World War.

Meantime the depression of the thirties had brought home a realisation of the importance of the pig to the New Zealand dairy farm. W. Riddet and C. P. McMeekan of Massey Agricultural College from an investigation of pig production on farms in the Manawatu district concluded that, under the current low cost/low price conditions (9d. per lb for butterfat) skim milk, efficiently used, would yield a greater net return to the farmer than butterfat.

Under these conditions the pig industry developed strongly. It was aided greatly by the formation of the pig recording groups in Canterbury where M. J. Scott (see caption to illustration above) had earlier pioneered the first scientific feeding experiments in this country; in Manawatu under the guidance of Riddet of Massey; and in the Waikato, where, after a start was sponsored by the Government through a Department of Scientific and Industrial Research grant to the N.Z. Co-operative Herd Testing Association, the first pig recording club in this country was established early in 1930.

While the material published in the "Journal" on pig husbandry hitherto was based principally on the writer's observations from practical experience, it was possible in the first report on pig recording investigations in 1930 to set certain standards of production and to analyse the data obtained to define which factors were of greatest importance in management.

Pig Recording Clubs

After a setback in pig recording work due to financial stringency owing to the depression of the thirties the recording clubs formed in the Waikato and Manawatu were able to carry on the work. McMeekan, recently graduated and on the staff of Massey Agricultural College, worked closely with the Manawatu club carrying out investigations the results of which were published in a series of articles in the "Journal" between 1936 and 1937.

These articles defined more precisely the factors in good pig husbandry under skim milk and buttermilk feeding as practised in New Zealand. Certain production standards were set which have proved useful yardsticks for advisers in this field ever since.

These include:

1. 40 lb of pigmeat per 100 lb of butterfat on home separation.
2. Sow/cow ratios of 1:5 to 7 for porker production to 1:10 to 12 where bacon is the major product.
3. 14 pigs weaned per sow per annum.
4. Meals can be used to increase profit if used in the creep and generally for younger pigs at ½ lb to 1 lb per pound of meat produced [at costs and prices ruling at the time].
5. Porker production gives slightly better returns than baconer production, but for convenient management a combination is most effective.
6. Home breeding is more generally associated with efficient results than fattening of purchased pigs.
7. Planned farrowing to give litters in May-June-July and again in November-December-January.

[*S. P. Andrew*

M. J. Scott, Superintendent of the Pig Industry, Department of Agriculture, from 1936 to 1943. He was a passenger on an aircraft which disappeared in 1943 while on a flight from Fiji to New Zealand.

Reports of winter feeding trials and of investigations of carcass quality requirements for the export market, which had become of considerable importance, were included in McMeekan's series of articles.

National Pig Industry Council

Meantime Scott, at Lincoln, and H. M. Peirson, Recording Officer for the Waikato Pig Recording Club, had been doing good work in their respective spheres. When the National Pig Industry Council was established in 1936 the former was appointed Superintendent of the Pig Industry, Department of Agriculture, with the responsibility for developing an advisory service to producers.

When this was established Scott arranged for collection of a considerable amount of information on pig production through the Department as well as through the new district pig council supervisors. Scott and Peirson, who had been appointed as Extension Officer in the Department, used

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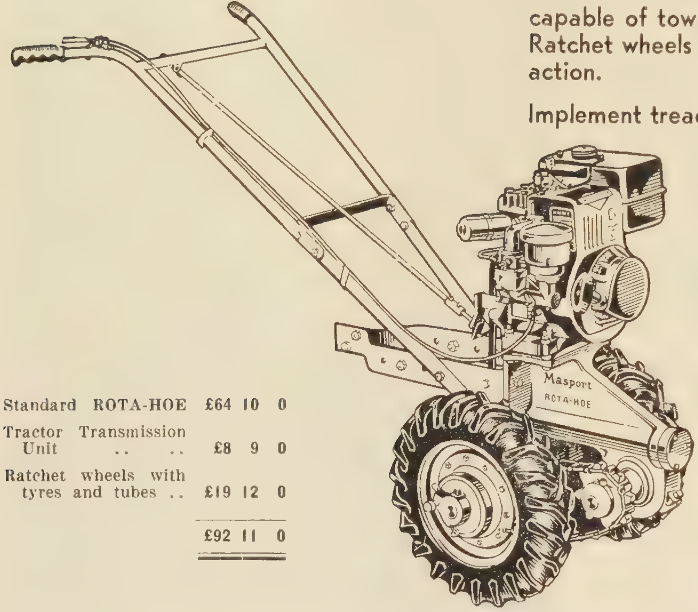

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the data collected very effectively in advisory work. Articles based on information recorded on New Zealand farms now began to appear almost every month in the "Journal".

By 1938 additional information began to come from pig husbandry investigations at Ruakura, where C. E. Ballinger was working chiefly on feeding of breeding sows, wintering of pigs for subsequent baconer production, and feeding of baconers to produce carcasses to conform with grading standards which were being drafted and were finally implemented by regulation in 1940.

The importance of housing and management in prevention of disease in pigs was emphasised in articles appearing at this time by D. Marshall, who as Veterinarian for the Department in Hamilton was on the executive of the Waikato Pig Recording Club during its most active period.

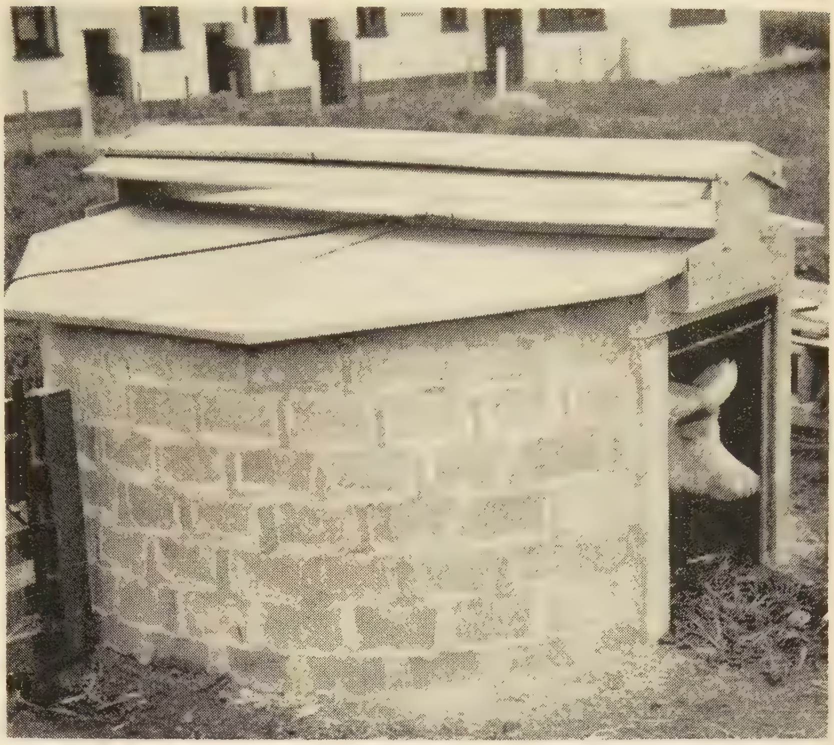
Scott's articles over this period show that he was attempting to check the limited data obtained by recording clubs on a national basis. Though he was without adequate resources to do all he wished, his work was most valuable and his practical interpretation of the facts elicited from the wider surveys were of great value to advisers in the field and to farmers.

Wartime Difficulties

Unfortunately while the pig industry was on this high plane the Second World War broke out and uncertainties about the future and a threatening acute labour shortage on farms began to undermine pig production. The Department's advisory work, which had hitherto aimed at greater production and higher quality through more efficient management and the growing of supplementary crops had to be diverted to deal with the extraordinary difficulties which arose directly from wartime conditions. The production pattern had to be shaped to war requirements as nearly as our dwindling labour force would permit.

Australian barley was available cheaply in 1940 and the best use of this was well publicised through the "Journal". This assisted to make the 1940-41 season a record one for pigmeat production with a total of over 52,000 tons.

Because of shortage of shipping space, tallow accumulated in New Zealand, but publicity given to trials in which it was used as a pig feed led to the wide use of animal fat to supplement the fat-deficient diet of pigs on New Zealand dairy farms, and this has been continued with success ever since. Dried, uncrushed copra also became available for a short time and provided a welcome cheap source of highly concentrated supplement for pig feeding.



The prototype round farrowing house at Ruakura Animal Research Station. This type of house was developed principally to reduce losses of young pigs. The roof design of the prototype house was not satisfactory.

Sugar beet, after having been tried out for a year or two at demonstration farms under Department supervision, was publicised as a crop eminently suitable for wintering pigs, particularly as when it was supplemented with concentrates (1½ to 2 lb, including ½ lb of meat meal, per pig per day), pigs of 65 to 90 lb liveweight were shown to be capable of gaining 1 lb liveweight per day. This indicated that economical winter fattening was possible.

About this time Scott transferred to a wider sphere with the Primary Production Council, but before doing so reported in the October 1941 "Journal" on the third year's work on his survey of carcass quality in baconers. This report contained significant references to the generally poor rate of growth of the pigs surveyed, but still more important, on a growth-rate standard of a 142 lb carcass in 28 weeks, there were very significant differences in rate of growth of pigs born at different times of the year:

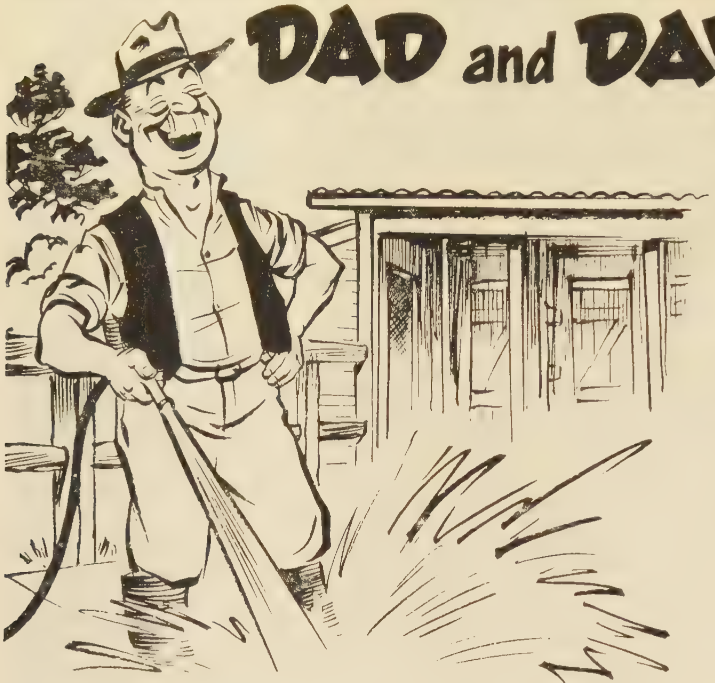
Pigs born in	Days older than schedule
Jan., Feb., Mar.	60
Apl., May, June	23
July, Aug., Sept.	29
Oct., Nov., Dec.	10

The survey covered 1,550 baconers and though no further facts regarding the management of the pigs were recorded, the differences are sufficiently striking to give solid support to the conclusion reached from other surveys that centring of farrowings on May and November is the best policy to fit pigs to the fluctuating feed supply available. Subsequent work analysing feed supplies and requirements of pigs on an individual farm basis or on the wider industry basis has served only to confirm this conclusion. The more recent development of early weaning has provided a modification giving scope for still further improvement.

Crop Subsidy Scheme

During the later war years there was a call for greater pig production to supply Allied forces in the Pacific and a £5 per acre crop subsidy was introduced as an incentive. However, shortage of labour was beginning to tell and very little effect was obtained from this measure. In fact, pig production was falling rapidly over these years, reaching in 1947 the lowest point since the beginning of the thirties.

Over this period the "Journal" reiterated the lessons of pig manage-



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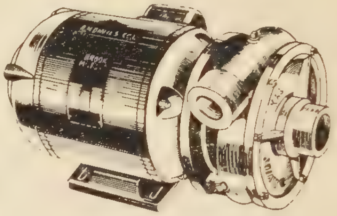

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ment which had been learnt, dealing in each article with a facet of management: Importance of good housing and layout, castration of pigs, specific diseases of pigs, litter production, care of pigs after weaning, management of breeding sows, and other subjects.

Articles on various aspects of feeding included a number dealing with whey feeders' problems. Other aspects covered were the feeding of various home-grown crops, balancing the feeds, relative food values of various foods, feeding of garbage, and storage and use of skim and buttermilk curd.

Post-war Period

After the war the increased demand for milk proteins for direct human consumption made it evident that, as less pig food would be available from this source, more attention would have to be given to efficient use of whey. A survey showed that 17 per cent of the whey available was discarded in factory drainage. In an effort to stop such waste articles dealing with planning fuller utilisation of whey and examples of efficient use of it were featured in the "Journal" in 1947 and 1948.

Analysis by the author, then Assistant Superintendent, Pig Industry, in 1948 of trends in the pig industry over the previous 20 years showed that a serious position had developed as a result of the war, the number of sows and of total pigs killed having declined by 33 per cent. Because of a trend toward the production of a higher proportion of baconers, the decline in the tonnage of pigmeat was less severe (about 20 per cent). He pointed out that more sows were the first requirement and if the lessons learnt in the provision of adequate winter feed and efficient use of all feeds were applied, there would be every possibility of holding the higher level of pigmeat production per sow (11.6 cwt) then being achieved.

Though local consumption was 33 per cent above the pre-war level, he pointed out that the potential for production was double the local market requirement. The author urged that immediate attention be given to stimulation of overseas demand by supplying the quality carcass which would be preferred when free marketing, suspended during the war, was resumed.

Pig carcass competitions, which had been carried on in a limited way during the war, were given a great deal more attention to stimulate interest in quality. Failure to secure agreement on a system of marketing which would give effective encouragement to the production of quality carcasses resulted in emphasis in these competitions being shifted from 1951 onward to the combination of good growth-rate and carcass quality. As an indication of all-round efficiency this had direct meaning to the producer, even though he found difficulty in securing a premium for high quality.

H. M. Peirson, Superintendent of the Pig Industry, Department of Agriculture, from 1944 to 1949, discussing carcass quality with a United States Army officer during the period when New Zealand was supplying considerable quantities of pig meat to Allied forces in the Pacific.

To investigate the reasons for the low number of pigs marketed per sow in this country as compared with that in some overseas countries recognised as having a good standard of pig husbandry a survey carried out through district pig council supervisors was begun in 1948. Results were published in the "Journal" in 1951.

This survey revealed weaknesses which led eventually to the development of the Ruakura round farrowing house and the National Hybrid sow, through which it was hoped to make available more prolific and hardy breeding stock to farmers whose management would enable them to exploit prolificacy.

Though the results of work carried out at the Department's Research Stations is published directly in the "Journal", the general pattern has been to await a period of practical application of the findings of research by progressive practical farmers before making definite recommendations about a new practice.

As a result of information accumulated and published before and since the war the advisory service had built up comprehensive information on raising pigs. When, therefore, in 1958 dairy product prices slumped and farmers were looking for means to offset lower returns from this source, the Department was well prepared to assist them to develop pig keeping. An increase of over 100,000 pigs in the following season was in some measure due to the publicity given in the "Journal" to the scope for improved returns from pigs.

With the trend to more enclosed pig housing, studies have been made of various types of house design and materials, and advice given through the "Journal" has described both construction and management needed for satisfactory results.

A recent survey (the "Journal", January 1959) showed that pig production on farms still lags behind advocated standards. Many farmers did not know what services were available to them or that they were, in fact, contributing to the cost of providing a local advisory officer. A large percentage of farmers read the "Journal" articles on pig keeping, though a fairly high proportion did not implement the recommendations. This is probably a reflection of the continuing attitude of regarding pig keeping as a sideline—until economic stress rekindles interest.

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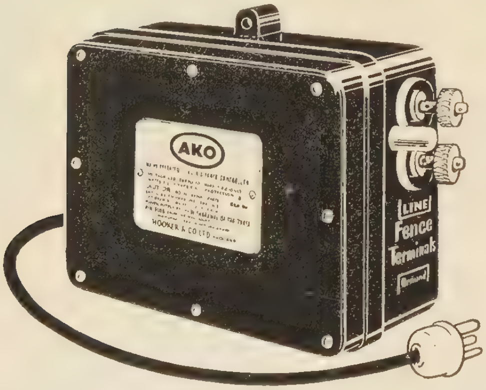

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“Journal” Record of

The Poultry Industry

By F. C. BOBBY

THE first interest shown by Government in the raising of poultry in New Zealand is recorded in the second issue of the "Journal" (July 1910) in which J. L. Bruce, Assistant Director, Livestock and Meat Division, recalled that in 1896 a decision was taken to appoint the first poultry instructor—known in those days as the Poultry Expert. The reason given for this appointment was "to impart information and instruction to settlers concerning the selection and management of poultry generally". This objective was carried a step further shortly after the appointment of this officer by the establishment of several State poultry stations where approved strains of poultry could be developed and experience of poultry husbandry gained. Importations of superior laying stock were made from the U.S.A. and Australia. Thus is recorded the start of a poultry industry in New Zealand and the beginning of State assistance to poultry keepers.

APPARENTLY those interested in starting poultry farming for a livelihood during the past 50 years have differed little in outlook. In September 1910 the poultry instructor of that time looking back over seven years of instructional work stated that the commonest cause of failure in poultry farming was due to “want of experience and want of capital”. This has been repeated over the years and even today enthusiasts who have kept 12 hens apparently profitably assume that 1,200 would bring in a fortune. So could be written today that which was recorded in 1910:

> . . . the number of enquiries received by the Division from men and women anxious to take up poultry raising, with little or no practical knowledge of it and little or no capital, has been greater than in past years.

“Will poultry farming pay without selling sittings of eggs and stock at a high price?”, a question asked in 1910, has been repeated from time to time ever since, though in more recent years with “day-old chicks” substituted for “hatching eggs”. Profits from eggs have fluctuated over the years, but the sale of either hatching eggs or day-old chicks and stock has contributed substantially to the income of commercial poultry producers.

Economic Survey

An economic survey of the poultry industry carried out by E. J. Fawcett, then Farm Economist and later Director-General, is recorded in the “Journal” of March 1930. Among his conclusions were these:

1. The products are a necessity in the family menu and rank very high in food value.

2. Eggs represent a considerable item of expense in the household budget where they have to be purchased.

3. Poultry can be housed in a confined space and are therefore kept by approximately 50 per cent of the householders of the Dominion.

The first conclusion has been confirmed by the steady growth of the poultry stocks of the Dominion as the population has increased and by the manner in which poultry producers have welded themselves into the present well organised industry. Conclusions two and three still hold good; about 193,000 householders are keeping poultry today. However, a further conclusion, that “the industry is difficult to organise”, is not now valid as a result of the marketing of eggs being placed under the control of the New Zealand Egg Marketing Authority, an entirely producer organisation.

Breeds and Breeding

From comments made by the Poultry Instructors in articles written between 1910 and 1912 it would appear that settlers bringing poultry to New Zealand at the turn of the century landed mainly birds of a show type which laid only a small number of eggs. Even when these breeds were crossed the resultant “mongrels” as they are referred to failed to give reasonable egg production. However,

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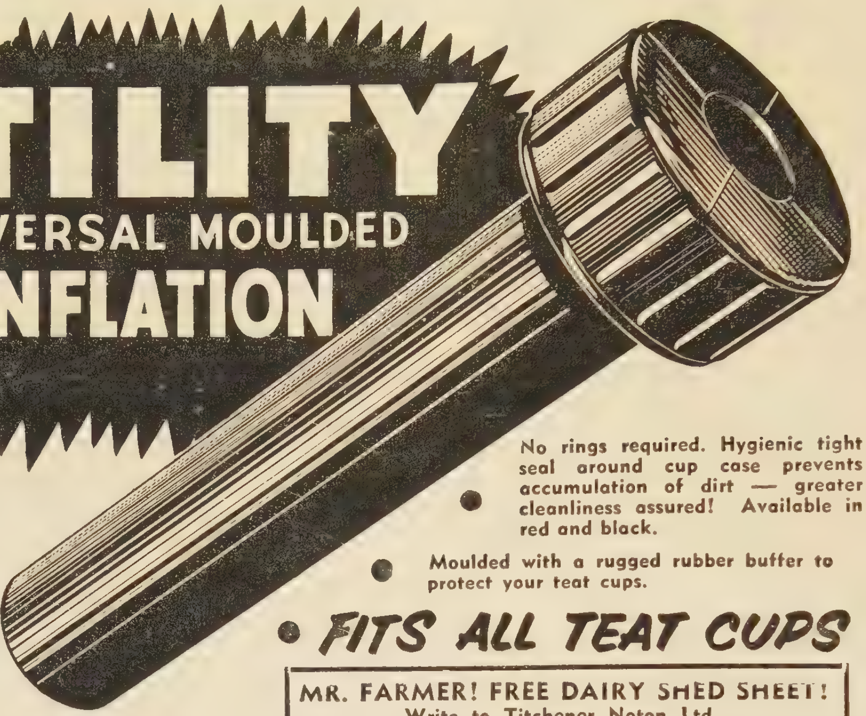

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it is apparent that by 1910 the Department had fully realised the necessity for importing stock from lines of poultry that had been bred for egg production and had proved their worth in egg-laying trials in the U.S.A. and Australia.

Thus improved laying strains of various breeds were imported with Government finance. Just how wide these importations were can be seen by the list of breeds offered to the public by the Department in 1910 from the State poultry stations at Ruakura, Moumahaki, Burnham, and Milton. Lists printed in the "Journal" at that time include Campines, White and Brown Leghorns, Minorcas, Wyandottes, Orpingtons, White Rocks, and Barred Rocks. Reference is made in the years before the First World War to the value of heavy breeds as "dual purpose birds" for supplying both eggs and table poultry.

Later, between the two world wars, less and less reference is made to heavy breeds and more to White Leghorns, which obviously became the most popular and predominant breed. In 1940 the remaining State poultry farm (at Wallaceville) carried mainly White Leghorns, a small flock of Australorps, and a few Black Langshans. Since the Second World War the Department's poultry plant at Upper Hutt has concentrated solely on two pure breeds, White Leghorns and Australorps.

From 1910 to 1920 stress was placed on the superiority of purebreds for egg production; crossing breeds and breeding from crossbred birds was referred to as "mongrelising". However, comment by F. C. Brown, Poultry Instructor, in 1920 is interesting:

> It must be admitted that a first cross may prove to be a phenomenal egg producer, but it does not follow that like will produce like in the offspring.

The first part of this statement is almost prophetic, as 20 years later the Department was recommending the breeding of crossbred pullets to increase egg production. By 1949 articles in the "Journal" are recommending first crosses, particularly with White Leghorns and Australorps, for use by both commercial egg producers and household poultry keepers. The continued increase in the use of crossbred pullets up to the present has played an important part in the stepping up of winter egg production at the expense of White Leghorns. This breed has slowly deteriorated over the years in this characteristic and in consequence has been supplanted in many flocks by crossbred birds.

Early references to poultry breeding are confined almost entirely to the selection of breeding stock by handling and external characteristics. Mention is made of the value of trap nesting pullets as a means of selecting the high producers for use as hens for breeding.

Not until 1949 is the first mention made of the modern principles of poultry breeding, including the importance of the results given by a family instead of by an individual.

On the other hand from 1910 for 25 years attention was drawn constantly year after year to the great importance of selecting for constitution in choosing breeding stock. With the steady increase over these years of mass-production methods, which have been carried on ever since, some of the health and vigour of the stock of earlier years appears to have been lost.

The "Journal" reported in 1913 that the average egg production of all birds in the New Zealand Utility Poultry Club laying trial for 48 weeks was over 200 eggs per bird, with the best bird laying 272 eggs. This, stated F. C. Brown, established the superiority of purebred birds and sounded the death-knell of the crossbred. A 48 weeks' laying trial held in the South Island finishing at the end of February 1959 gave average egg production per bird for Australorps (150 pullets) of 192 eggs and for White Leghorns (60 birds) of 169 eggs. An obvious question is "what progress in breeding for egg production has been made in the last 46 years?" The need to employ modern methods of breeding as practised in the more advanced poultry producing countries overseas is equally obvious.

Egg-laying Trials

While in the earlier years of the "Journal" frequent mention is made of egg-laying competitions or trials, references are made only to the valuable part they played in testing pure breeds and identifying the better stock. These competitions were subsidised by the Government as an incentive to poultry breeders to improve the stock of the country. The Second World War caused the cessation of all laying trials and not until 1949 was any attempt made to revive them.

In the April 1950 issue appears a report on the first breeders' laying trial run by the Department at the Poultry Demonstration Plant, Upper Hutt. This trial, which was conducted each year during the next eight years, differed from all other laying trials in that entries consisted of 20 pullets instead of the usual five to 10.

The higher number of birds per entry was decided on because it was a better sample of a breeder's flock for testing and it gave the owner greater scope for selecting a breeding pen from the best trial birds. This type of trial was nearer to the random-sample tests which have since been established in a number of countries and are now completely taking the place of the earlier trials consisting of pens of five to 10 selected pullets.

[*S. P. Andrew*

F. C. Brown, Chief Poultry Instructor, Department of Agriculture, who from an early stage in the development of the poultry industry until his retirement in 1935 did much to assist and encourage producers. He was for many years a prolific contributor to the "Journal".

Incubation

Just how guarded was the first reaction to the introduction of artificial methods of incubation is shown by a statement attributed to the manager of the Department's poultry station at Burnham that:

> He would not recommend the farmer to hatch by artificial means. He never used a cock unless it was hatched under a hen—not in an incubator. (The "Journal", December 1910.)

Three years later F. C. Brown pointed out that it was necessary to use artificial incubation to hatch pullets at the right time to get satisfactory winter egg production. From that year onward artificial incubation was advocated and instructional articles written regularly.

The introduction of cabinet incubators in the early 1930s was an event of considerable importance and one that had a substantial effect on poultry farming in this country. It could well be described as the first step toward mass production, but the wrong use of large cabinet incubators undoubtedly had an adverse effect on the poultry stocks of the Dominion. Once a large cabinet incubator was installed the temptation was to mate sufficient

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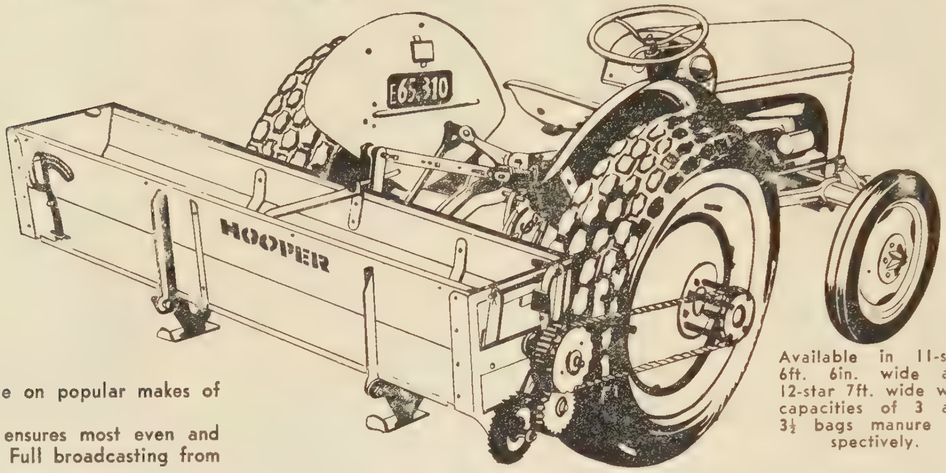

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stock to fill it, irrespective of how low the standard of selection had to be dropped to get sufficient breeders. It is strange, therefore, that there does not appear to be any reference in the "Journal" to cabinet incubators until August 1941. By this date cabinet incubators had almost completely replaced the original flat-top machines.

The sexing of chicks at a day old, another development of importance, is not mentioned until 1935, when the results of the first chick-sexing examination held by the Department are recorded. Fifteen candidates were examined. None was granted a first class certificate, but three obtained second class certificates. The first chick sexing carried out in New Zealand was done by a Japanese brought to the Dominion for this purpose at about the same time as cabinet incubators were first imported (from Australia).

It is recorded in August 1941 that the Department abolished the granting of second class certificates for examinations as a means of raising the standard of chick sexing. Chick sexing was considered so important that in 1943 those carrying out the work were not allowed to go overseas when called up for military service.

Chick Rearing

Over the years until about 1942 young growing poultry stock were seldom provided with free range. This applied particularly to the handling of growing cockerels needed for future breeding, but often also to growing pullets, which were being raised on limited grass runs or sometimes wholly intensively.

In 1942 the Department published an account of a summer range shelter for use on free range for either growing pullets or cockerels and at the same time recommended strongly that these young growing birds should be given ample free range on clean grassland before being placed in laying houses or, with cockerels, in breeding pens. In subsequent years these summer shelters or range houses began to appear from one end of New Zealand to the other; today the original type or modifications of it are common in all districts. The publishing of details of this house succeeded in persuading poultry farmers to raise growing stock under vastly better conditions.

Housing

In the "Journal" of 1910 F. C. Brown stated:

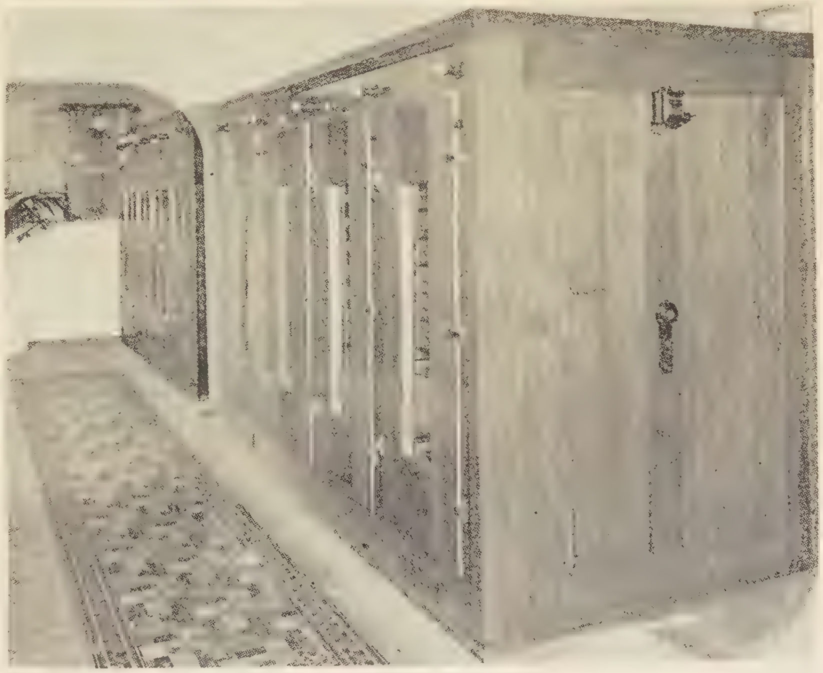
> The proper housing of fowls is one of the most discussed questions of the day. . . . the old, closed-in and ill-ventilated house must go. The open front and draught proof structure is the ideal to aim at.

By 1912 the Department was advising that houses of a lean-to type and 10 to 12 ft deep should be used as laying sheds. Additionally it was recommended that the use of droppings boards under perches should be discontinued because they were not being cleaned regularly and consequently were unhygienic.

Up to this time all poultry establishments had outside grass runs and were mainly using the semi-intensive system. The intensive system was first considered and under trial in 1915; it was a most significant development, as this system—the keeping of laying birds inside a house throughout their productive life—was to become and has remained the most popular method of housing laying stock and chickens.

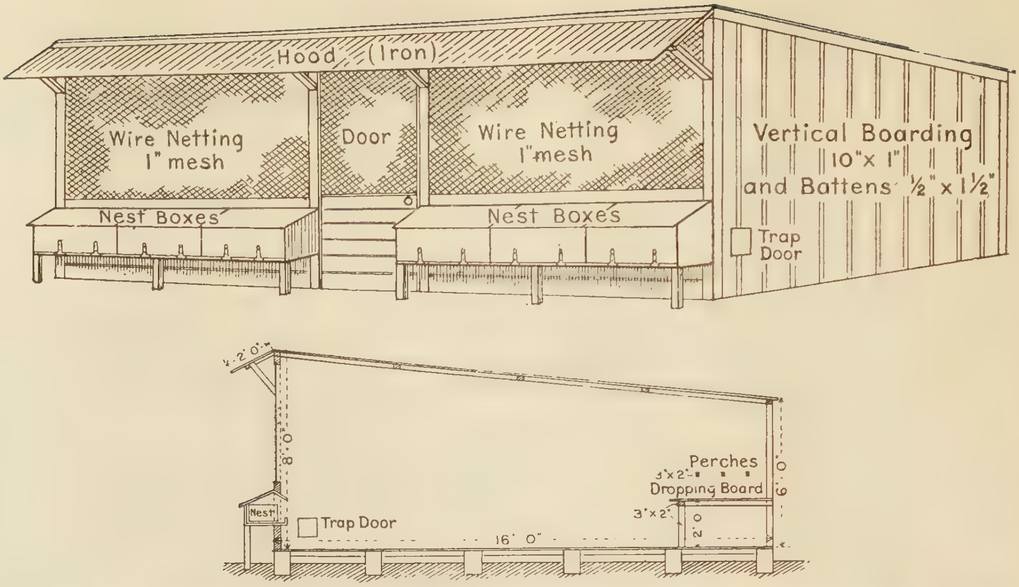
An article written and illustrated by A. E. Salisbury, Poultry Instructor, on housing for laying stock in 1916 is remarkable in that the main features of the housing described differ little from those still advocated in an article by S. G. Haddon, Poultry Instructor,

Above—Old, flat-top incubators in a hatchery of a poultry farm established in the Hutt Valley in 1912. Below—The same hatchery, showing large cabinet incubators now used. A. E. Salisbury, who developed the poultry establishment, was a Department of Agriculture Poultry Instructor for some years until 1918.



LAYING HOUSES

OLD...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Door
Wire Netting 1" mesh
Vertical Boarding 10"x 1" and Battens ½"x 1½"
Nest Boxes
Nest Boxes
Trap Door
2' 0"
8' 0"
Perches
3"x 2"
Dropping Board
6' 0"
Nest
Trap Door
16' 0"
3"x 2"
2' 0"

Diagram of an open-fronted laying house included in a Departmental publication in 1916. Many houses of similar design are still used.

and NEW

A modern type of house in the Christchurch area which has proved successful.

over 30 years later. This illustrates well that housing for the brooding of chickens and for laying stock has not altered substantially for many years.

Today there are many lean-to brooder and laying houses 16 to 20 ft deep and varying in the extent to which the front is opened up with wire netting. However, during the past 10 years much more attention has been paid to modern types of housing, particularly for laying stock. Thus today there are (mainly in the Auckland area) two-storey houses, sawtooth houses, full-span houses, and large units capable of holding up to 1,000 pullets in one flock or pen. The trend is to increase flock and pen size as compared with the 50- or 100-bird pens of the past, the intention being to increase the number of birds handled by one man and so reduce labour costs.

Systems and Management

After the changeover from the free range and semi-intensive systems to the intensive system for laying birds and until 1950 practically all laying birds were run on the floor on deep straw or other suitable litter. Laying cages for poultry in New Zealand were first described in the "Journal" in March 1953, though the battery laying cage system had been used in the United Kingdom for many years.

In the last seven or eight years many cage units have been established, particularly in Canterbury, where there are units of 6,000 to 8,000 birds. Interest in the system has been stimulated by further articles published in the "Journal", and the system now appears to have become accepted as an economic method of egg production.

The successful production of eggs in winter has always been an objective of commercial egg producers. A valuable aid in recent years has been the use of artificial lighting. This practice was first referred to in the "Journal" in July 1914, which contains a report from London that W. H. Cook Ltd., Orpington, England, had used artificial lighting successfully for both young chickens and laying stock. Electric lights were used in the early morning and again in the evening during the short winter days. For some unexplained reason it was many years before this method of increasing egg production became popular in New Zealand. The next mention of this method of management was in the June 1941 "Journal", but since then the vast majority of commercial egg producers have installed electric lighting in their laying sheds and laying cage houses. Lighting is not commonly used for chickens during the rearing period.

Feeding

As would be expected much has been published in the "Journal" during the last 50 years about feeding of poultry. Recommendations made in the early years make strange reading today. The most impressive feature of advice given between 1910 and 1940 was the simplicity of the rations. Thus for nearly 30 years mash for laying birds consisted of pollard and bran with a protein feed.

In 1910 cooked meat was claimed to be superior to meat meal and surprisingly poultry keepers were advised to use blood meal. The last is rarely used today despite its high protein content, as it is not considered to be suitable for poultry; the growth rate of chickens fed it is slower than that of birds fed meat meal. Also strange was advice given in 1913 to start chickens on dry pinhead oatmeal with some finely broken egg shell. Pullorum disease could hardly have been a problem then if it was safe to feed crushed egg shells. Another starter suggested for chickens was hard boiled eggs and breadcrumbs.

By 1916 the Department was recommending the use of meat meal in place of cooked meat and in 1920 charcoal was suggested for birds of all ages. Meat meal is still the most commonly used protein-rich food, but charcoal has long since been discarded from rations.

Use of Barley in Place of Wheat

In view of events in 1958, when North Island producers objected to having to use barley instead of wheat, the results of a feeding experiment carried out by the Department in the early 1930s (see August 1933 "Journal") is interesting. In the experiment the egg production of two groups of 40 White Leghorn pullets over 48 weeks was compared. One group received mash containing wheat meal and wheat as a grain feed; with the other group barley meal was substituted pound for pound for the wheat meal in the mash and barley for wheat as a grain feed. The group receiving wheat rations produced 175 eggs per bird whereas that fed barley rations produced 189. In 1958 many poultry producers claimed that egg production was reduced and costs of production raised, though the prices of wheat and barley at that time were equated.

Some of the biggest changes in poultry feeding in the past 50 years are reflected in articles published in the "Journal" since 1942. Until then ingredients used in poultry mashes were invariably expressed in parts by measure, with the exception of meat meal, which was given in percentage form. This was a very unsatisfactory method of setting out a formula for a poultry meal and in consequence the Department through the "Journal" caused the method to be discontinued and a parts by weight specification to be adopted. At the same time fuller information was published on the scientific principles of feeding. The first reference to the feeding of pellets to poultry was made in 1953. Though this system of feeding has been adopted increasingly since that time, it cannot be said to have become very popular.

Though the importance of vitamins in poultry rations received little attention until after the last world war, there was a marked change toward vitamin-rich additives in 1952 as the result of a report by the Department on a feeding trial designed to demonstrate the need of laying pullets for vitamin A and the failure of green feed at certain seasons of the year to supply an adequate amount of this vitamin. Rarely has the report of a feeding trial in New Zealand had such a far-reaching effect on the feeding of poultry. After publication of the report mash manufacturers and producers started to incorporate cod liver oil in laying mash. Later synthetic vitamins replaced the cod liver oil. Whereas before the report of this trial substantial numbers of laying birds were found to be suffering from vitamin A deficiency, this trouble almost immediately disappeared.

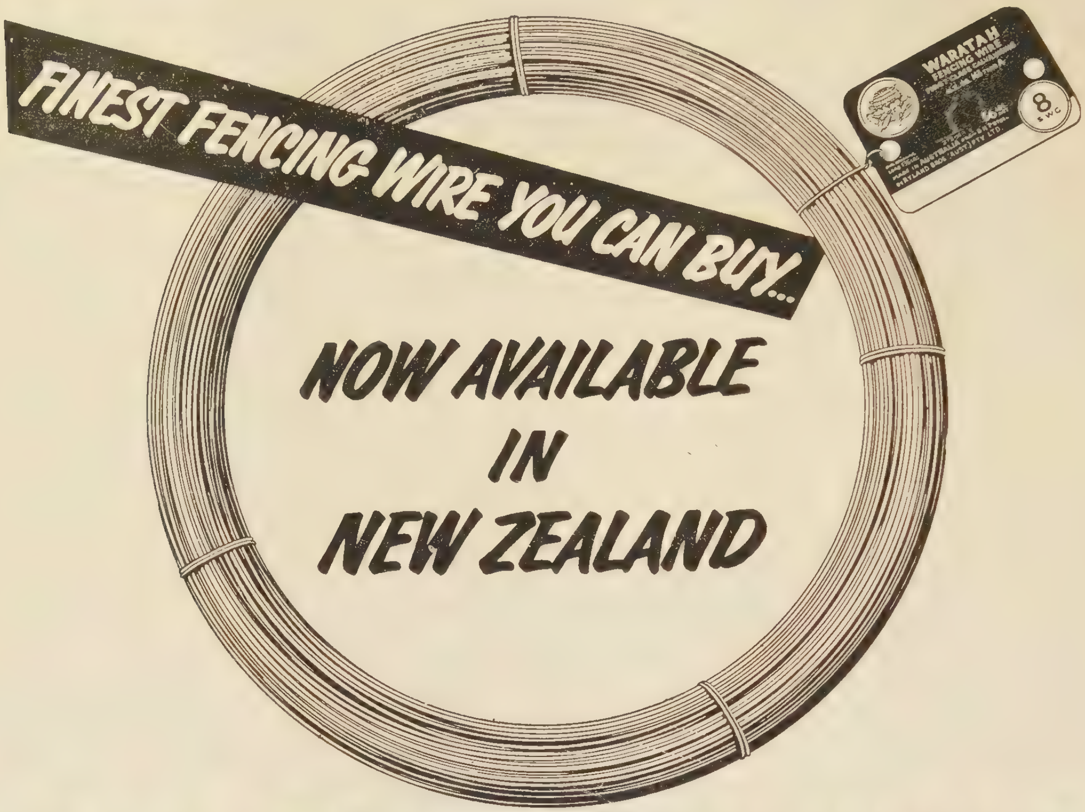
Accurate Assessment of Food Value

During the last five years attention has been drawn to an efficient method of assessing the true value of a laying mash for producing eggs. Formerly the value of a mash tested in a feeding trial was based on the average number of eggs laid by the groups of birds used. Today the results of trials with laying mashes are expressed in terms of the cost of the mash required to produce a dozen eggs. This gives the true efficiency of a mash.

Using this assessment the Department has reported during the last three years on feeding trials in which the present "high energy" or "high efficiency" mashes were tested for the economic production of eggs. These laying mashes include ground meals from wheat, maize, or barley which have a high calorie value compared with that of bran and pollard, which have made up about half of laying mashes for many years but are now considered to be less efficient from a feeding value aspect than wheat meal, maize meal, etc. Poultry farmers' attention has been directed to these more efficient mashes through the "Journal" articles describing feeding trials conducted at the Poultry Demonstration Plant.

Diseases

Very few references to poultry diseases are to be found in "Journals" between 1910 and 1940. This might well be due to lack of serious disease problems over these 30 years, though perhaps also because knowledge of poultry diseases then was limited.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[Optimus

▲ The State poultry station established at Milton, showing brooder houses and runs used for raising improved strains of laying birds for distribution to poultry farmers in the early days. The Milton station, one of four similar stations financed by the Government in 1910 when the "Journal" began publication, was closed in 1921.

▼ A section of the Department's Poultry Demonstration Plant at Upper Hutt, which was established after the Second World War. In the first 10 breeding pens on either side of the roadway are individual male birds being used as part of a breeding project employing family testing based on full-sister recording.

"Curing disease cannot enter into the realms of utility poultry keeping. Prevention is the only policy", said a 1914 contributor. He contended that constitution in the stock and cleanliness on the farm were the main means of checking disease. That is equally true today, but unfortunately producers are tending to depend more and more on drugs and less and less on the constitution of their stock.

Tuberculosis, which is seldom found in commercial poultry flocks today, though present to a limited extent in farm poultry and household flocks, is first mentioned as being troublesome in 1910. Further attention is drawn to this disease on a number of occasions in the next 20 years. In those earlier days the disease was always referred to as "going light".

Intestinal worms are mentioned in 1910 and by 1930 the Department is recommending the use of nicotine sulphate as an effective vermifuge when fed in wet mash. This treatment was common for the next 15 years.

The first recorded outbreak of fowl pox is reported in 1914. It is curious that this disease has caused trouble in the North Island ever since, but little trouble in the South Island.

First Account of Pullorum

Published in the December 1943 "Journal" is the first account of pullorum disease in chickens and the method of control by blood testing the parent stock. This marks the start of a policy which has been continued to the present and has involved the Department in a heavy programme of work. Blood testing for pullorum disease, up to 300,000 birds in a season, has been one of the greatest services rendered to poultry producers by the Department.

Blackhead in pullets is described in 1953, though outbreaks in chickens were observed long before that. Two matters connected with this disease are of interest, This parasitic disease has always been associated with turkeys and rarely with chickens. In New Zealand, however, it has attacked both young turkeys and chickens, causing serious losses of each.

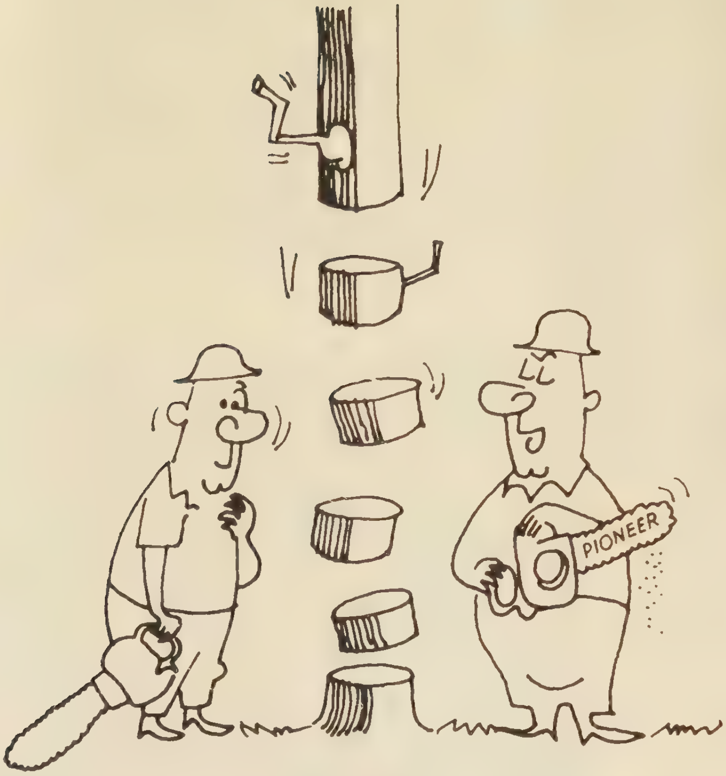
"Entramin" (2-amino 5-nitrothiazole) used overseas to control blackhead in turkeys was proved to control this disease in chickens. However, after "Entramin" was used during an outbreak of blackhead in chickens at the Department's poultry plant in 1954 there were indications that the drug had an after-effect on the date of sexual maturity and egg production of the birds treated. An experiment to confirm or remove this suspicion (the "Journal" September 1956) demonstrated clearly that "Entramin" affected sexual maturity and egg production. Consequently, through the cooperation of the firm distributing this drug, it was withdrawn from sale for chickens and replaced by a similar drug which was without the undesirable after-effects.

Infectious laryngotracheitis (I.L.T.) was first diagnosed in New Zealand in 1957, though it had probably been present in the Dominion in a mild form for a considerable period before that. A description of this disease was given in the September 1957 issue. The Department undertook a substantial programme of vaccination in the spring of 1957 in an endeavour to keep this disease under control. Since then I.L.T. has apparently caused only limited trouble.

Marketing Eggs and Poultry

It has taken a great many years to induce the average commercial egg producer to take a proper interest in the quality of the product—eggs—on which he depends for a living. Thus is written in 1911: ". . . yet it is only the exceptional men, to be counted on the fingers of one hand, who present their eggs to the consumer as they should". Eight years later the Department reported: ". . . a general improvement, but there is, however, still a decided need for further reform in this direction".

Twenty-two years later (1941) a "Journal" article "Bad Eggs" began:



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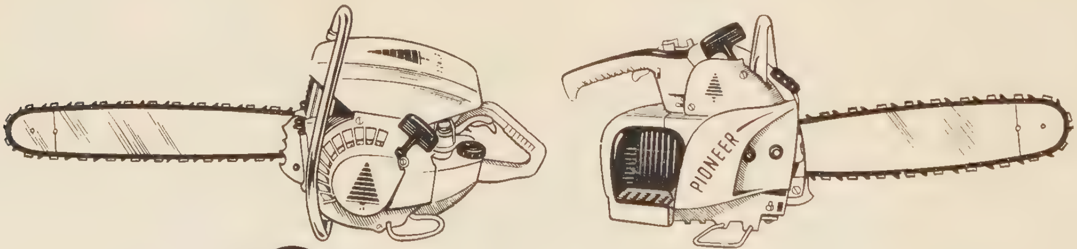

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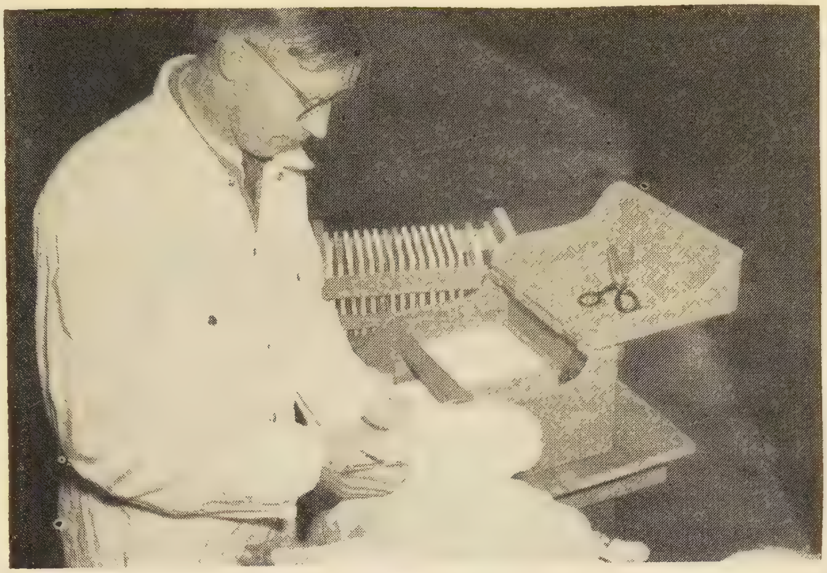

Blood testing for pullorum disease has become an important Department of Agriculture service since attention was first drawn to this disease in the "Journal" in 1943.

"Numerous complaints were made by consumers last January of what were termed 'bad eggs' ".

Between 1941 and 1949 several articles were written on the need for quality eggs. This drive to persuade poultry producers to handle and present eggs for sale in better condition, aided later by a strenuous campaign by the New Zealand Egg Marketing Authority, achieved considerable results. Today there are comparatively few complaints about poor eggs and the public have learnt to place confidence in eggs sold in cartons.

The development of the poultry industry is closely associated with the history of egg marketing. In the early days before organised marketing of eggs supplies sometimes exceeded local requirements, and in 1912 the Department investigated the possibilities of relieving surpluses by export of eggs in shell.

A trial shipment of eight 30-dozen cases was sent by the Department to Vancouver. These were reported as arriving in excellent condition, having been carried in a Union Steam Ship Company vessel cool room with the temperature at 33 to 34 degrees F. These eggs gave a net return in New Zealand of 1s. 3¼d. per dozen. Further supplies were not sent at the time owing to shipping not being available.

However, by 1913 the first steps toward organised marketing had been taken, when cooperative "egg circles" were formed in various districts. A number of poultry farmers in Christchurch formed the Canterbury Eggfarmers Association, which followed the example set by the Department by exporting about 300 cases of eggs in shell to Vancouver. An experimental shipment was also sent to London in 1913, the London "Dairy" reporting: "They were found to be in splendid condition and could fairly rank as new laid. They compare favourably with anything on the market and hardly one was broken".

Between the world wars further and larger consignments of eggs were sent to the London market. All eggs for export were subject to inspection, testing for quality, and grading for weight by Poultry Instructors of the Department. The pattern did not change over the years in that exports were made only to clear surplus stocks. Returns were insufficient to give any incentive to production of eggs for regular export and this is still the position. Since the Second World War surplus eggs have been turned into frozen egg pulp and any supplies of this pulp not purchased in New Zealand by bakers and pastry cooks have been sold in the United Kingdom.

The setting up in 1953 of the New Zealand Egg Marketing Authority (a producer organisation responsible for the marketing of all egg products and for licensing egg floors, which carry out the collecting, testing, grading, and distribution of eggs to the retail trade) welded poultry producers into a well organised industry.

Table Poultry

Table poultry production and marketing showed little or no development over the years until recent times. In 1910 the situation was summed up as follows in the "Journal":

> While egg production has been so satisfactory the production of table poultry is still a neglected industry. Marketing of prime birds is practically non-existent.

In spite of a series of articles on the production of table poultry and an endeavour by the Department to encourage this side of poultry production little progress was made up to the time of the Second World War. There are no indications that any reasonable effort was made to produce quality table birds and less evidence that interest was taken in processing birds in a manner likely to make them attractive to the public. Table birds were just a by-product of an egg industry—the laying bird when she had finished producing eggs.

The first change came during the last world war when supplies of poultry were required by the American Joint Purchasing Board. Used to a high standard of quality in table poultry, the board put considerable pressure on those selling table poultry in New Zealand to improve the processing of birds. The improvement thus forced on the producer and merchant alike was soon reflected in the condition of poultry offered to the public in New Zealand. This improvement has continued until at present birds are well processed and attractively presented. Production has gone another step forward in that a few producers in both islands are now showing a keen interest in the production of what are termed broilers, a chicken about 10 weeks of age weighing 2½ to 3 lb.

No endeavour has been made to build up a regular export trade in table poultry, though limited quantities of birds were exported to the United Kingdom during the Second World War. However, this was purely a wartime effort to supply additional food to the United Kingdom.

Surprisingly the "Journal" of December 1910 records the shipment of a small consignment of turkeys to the United Kingdom. At no time have there been appreciable numbers of turkeys in New Zealand and only within the last 10 years have a few producers endeavoured to raise turkeys by modern methods.

Household Poultry Keepers

The "Journal" has done much to raise the standard of poultry kept by householders and the conditions under which birds are kept. Since 1942 articles specially written to assist householders have appeared regularly. These articles, which deal with all aspects of keeping small numbers of poultry, have been most popular and have been the chief means by which the Department has helped those who collectively maintain a high percentage of the poultry in New Zealand.

Battle Against Apathy

"Journal" Pleas for Eradication of Hydatids

". . . hydatid disease is preventable if thorough and complete measures are adopted, and the responsibility rests upon those who own or have charge of dogs . . ."—"The New Zealand Journal of Agriculture", July 1914.

Statements in similar terms are being made even today, but with the difference that at long last there is obvious widespread determination to act. The "Journal's" pages over the past 50 years have often drawn attention to the dangers and loss from hydatids and the need for treating dogs. It is inescapable that for many years, in fact until very recently, stock owners did not prove to be very receptive to the Department's urgings.

IN early advice there was a tendency to over-emphasise the dog dosing aspect. Writers at that time mentioned the importance of preventing dogs from having access to **infected** offal, but only later seem to have realised that the only practical recommendation was "no raw offal".

However, that due emphasis came to be given to this is shown by preventive measures listed in an article in the October 1929 "Journal", which were headed by the following:

> Never let dogs feed on raw offal. If this rule were strictly observed on farms, sheep stations, in the vicinity of country slaughterhouses, abattoirs, and freezing works the dogs could not become infested. If such offal is required for feeding dogs it can be rendered harmless by boiling before use.

The amount of boiling needed (now stressed as ½ hour) was not stipulated.

Ten years were to elapse before the feeding of raw offal to dogs was prohibited by law, though this it must have been realised would not stop the practice, which was merely a manifestation of apathy among dog and stock owners about hydatid control.

Dosing with Arecoline

In early articles powdered areca nut was prescribed for the dosing of dogs, but by 1929 there is reference to arecoline hydrobromide (prepared from areca nut). Even then the now familiar pills were apparently not freely available, because a "Journal" item published later that year announces the manufacture by a local firm of tablets to be marketed ". . . in

Group dosing of farm dogs had been developed to a high state of efficiency by some voluntary eradication committees by the time the National Hydatids Council took over direction of hydatids eradication.

bottles containing 20 doses, at a cost of 6s. 6d." The efficacy of arecoline had been known for many years and dosing with areca nut was advocated at least as early as 1897 when, according to the annual report of the Department, ". . . 80 per cent of the dogs in New Zealand are suffering from tapeworm and are continually voiding segments full of eggs each of which is capable of producing hydatid disease either in man or the lower animals."

Difficult Years

An article in the February 1935 "Journal" mentions hydatid disease in humans "increasing somewhat" and re-echoes what by now has become a familiar exhortation: "The incidence of the disease can be reduced, provided an effort is made to do so."

And a later significantly optimistic passage reads:

> The success of the reduction of the number of cases (of hydatids in humans) in Otago can be credited to those men in Dunedin and surrounding districts who have spent a good deal of time in teaching the people about this disease.*

This was a difficult period to promote a scheme such as that for hydatid eradication, because farmers and the country generally were just emerging from a period of austerity imposed by the most serious economic depression in New Zealand's history. People were naturally preoccupied with restoration of living standards, which in many instances had fallen during the previous four years to little above subsistence level. Nevertheless the key to the solution of the problem was at least realised, as indicated by the following statement in the "Journal" for December 1935:

> That only an intensive educational campaign will result in the disease being overcome is now widely recognised. . . . The Livestock Division has been endeavouring to improve matters for years by the use of press publicity, by lectures to farmers, and lately by means of broadcasting.

The same article suggested what was perhaps the main reason for so little progress in reduction of hydatid disease in farm animals despite considerable publicity:

> It is very fortunate for the farmer, but definitely inimical to effective control measures which depend on his cooperation, that the presence of hydatids in the liver and lungs causes so little financial loss. In practically all cases it is only these parts [liver and lungs] which need to be condemned, and their value is extremely small.

The last remark may have been valid for the period referred to, but with the lifting of the economic depression prices improved substantially. In 1939 a "Journal" article on hydatid prevention refers to the very considerable waste in the condemnation of millions of sheep's livers every year. Today losses of livers condemned because of hydatids infection are estimated to represent a reduction of over £2 million in returns from meat.

In 1939 came the issue with dog licences of arecoline hydrobromide for dosing of dogs. To assist farmers in the correct administration of the drug the "Journal" in September carried a well illustrated article showing steps in dosing of dogs.

Prejudice Against Arecoline

Allegations about the harmful effects of arecoline are not new. Sir Louis Barnett in the November 1941 issue of the "Journal" comments on "unwarranted rumours . . . and gross exaggeration" having "combined to create a scare against the use of the drug". Careful research work in the field and in the laboratory on thousands of dogs, he added, had shown arecoline tablets, when properly administered, to be safe and effective.

Detailed Article

"Prevention of Hydatids", an article by L. K. Whitten, Parasitologist, Wallaceville Animal Research Station, in the August 1946 "Journal" was the most detailed to have appeared on this subject. It undoubtedly created widespread interest in eradication, as frequent requests for information about this time led the Department to publish a bulletin "The Hydatid Disease" compiled by Whitten. Several editions of this have been printed and it remains a standard reference.

The present Chief Advisory Officer (Hydatids) in the "Journal" for October 1951 emphasised the thoroughness with which hydatid eradication would have to be conducted:

> . . . a few individuals who do not cooperate [in the eradication of hydatids], especially if they move about the country with dogs, can delay elimination indefinitely. However, if general opinion is strong enough recalcitrant dog owners may feel ashamed to find themselves detracting from the public welfare.

This need for thoroughness was obviously very much in the minds of those who several years later formed voluntary eradication committees to operate on the basis of complete area coverage.

Public Interest Roused at Last

About 1956 there were clear indications that, through campaigning by health authorities, officers of the Department of Agriculture, and voluntary committees, public opinion had at last been roused to support wholeheartedly measures aimed at eradication of hydatids. It was realised that a great deal had still to be learnt about the best methods for moving progressively toward total eradication. Research on some aspects of control was urgently needed and this led to the formation in 1957 of a Hydatid Research Unit by the New Zealand Medical Council.

An early report (the "Journal", February 1959) by the unit's director, M. A. Gemmell, made some suggestions which represented an extension of what had hitherto been the recognised eradication procedure. His recommendations included these:

- Only men properly trained should dose dogs and they should be responsible for dog registration. Arecoline hydrobromide should be used mainly as an agent for diagnosing tapeworm infestation.

- As soon as dog control officers are available dog owners should not be allowed to handle arecoline.

Gemmell's recommendation for the use of arecoline as a diagnostic agent has been adopted in the new phase of the hydatid campaign which has developed from the passing of the Hydatids Act 1959. Control has come under the direction of the National Hydatids Council (set up under the Act) and of local bodies. The latter have appointed Hydatid Control Officers—the dog control officers envisaged by Gemmell—who have received special training.

Apathy Gone

There has been a remarkable change in the attitude toward hydatids; the all too evident apathy against which "Journal" articles campaigned for many years has gone.

Henceforward the "Journal" will review the progress toward eradication rather than plead for interest in it.

---

* Sir Louis Barnett, Professor of Surgery at Otago University, in the 1930s organised an anti-hydatid campaign which culminated in the formation of the Hydatid Research Committee (of which he was chairman). Meticulous research by Dr Enid Batham and others enabled hydatid eradication measures to be drawn up on sound lines.

Horticultural Development, 1910-1960

WITH the emphasis on agriculture in the early years of New Zealand's primary industry, horticultural activities such as pip and stone fruit growing, beekeeping, market gardening, and viticulture were slower in becoming economically significant on a national basis. From its inception the "Journal" featured articles giving advice and information on the many problems confronting horticulturists and played its part in the development of the industry; for instance, by being an early advocate of the benefits of fostering an export market for fruit.

Inspection of export fruit at Nelson in the late 1920s before it was loaded on to a coastal vessel for transhipment to an overseas vessel at Wellington.

FOREMOST in major changes in the fruitgrowing industry in the past 50 years have been expansion in orchard planting and the development of export of pip fruits. Other major developments included the change from clean cultivation to pasture in orchards, bulk harvesting, and improvements in disease control.

Export of Apples

In the second issue of the "Journal"—that of July 1910—T. W. Kirk, then Director of the Division of Orchards, Gardens, and Apiaries, discussed the prospects of an apple export trade and stressed the importance to the country of such a market.

The same issue announced that to encourage the export of apples the Government offered a guarantee of 1d. per pound net to the grower, and gave a full report on a shipment of 4,499 cases of apples from Nelson to London earlier in the year.

The prospects of a good export market for apples encouraged further planting, and land development companies became very active in planting orchards for sale to the public, particularly in North Auckland, Nelson, and Central Otago. In the eight years from 1910 some 13,000 acres of orchards were planted, bringing the Dominion total to just over 27,000 acres by 1919.

With the support of the Government guarantee the export of apples expanded and eventually became firmly established. For many years the quantity of apples exported has exceeded 1,000,000 bushels and a record quantity of 1,750,742 bushels was sent overseas in 1958.

The export prospects induced a swing in planting away from many of the old-established apple varieties. A London merchant reporting on the Nelson shipment in 1910 recommended that New Zealand growers should ship only Cox's Orange Pippin, Cleopatra, Jonathan, Munroe's Favourite (syn. Dunn's Favourite), and Sturmer. Fifty years later these varieties and Delicious, Golden Delicious, and Granny Smith are still popular on overseas markets. Excluding Cleopatra and Munroe's Favourite, which have declined in local growers' favour, the other six varieties produce about 78 per cent of the New Zealand apple crop.

Fruit Variety Trials

The beginning of fruit variety trials on the horticultural experimental areas is recorded in the October 1910 "Journal" and recommendations based on variety trials over the intervening years have appeared from time to time in the "Journal".

ILLUSTRATIONS ON OPPOSITE PAGE:
The earlier method of harvesting fruit (lower) was into bushel cases; this has been superseded by harvesting into trailer bins (upper).

Photos by Sparrow (upper) and National Publicity (right).

Though a number of new varieties have come to the fore in the past 50 years, the change generally has not been very great. In the "Journal" of January 1911 W. A. Boucher lists the varieties recommended for planting and most of these are still in favour today.

Possibly the biggest change has been in citrus. Reference is made in the "Journal" of May 1927 to the testing and establishment of citrus trees. The true grapefruits had by then shown that they were more or less worthless for commercial production in New Zealand. The "Journal" recorded that "There is a decided leaning in this country towards the use of the Poorman orange as a breakfast grapefruit. . . ."

The introduction of the Morrison's Seedless strain of the Poorman orange did much to bring this fruit to favour as a breakfast grapefruit. (The Morrison's Seedless and similar strains are now known as New Zealand grapefruit.)

A full discussion of the Meyer lemon—unknown to New Zealand markets in 1910—appeared in the September 1949 "Journal". This variety has had a considerable effect on the lemon industry in New Zealand.

Three unusual subtropical fruits have become established commercially in New Zealand. They are the tree tomato, Chinese gooseberry, and feijoa. None of these fruits is indigenous to New Zealand, but they have become commercially popular because they fruit in winter out of season in relation to pip and stone fruits.

The "Journal" of May 1927 referred to the sale of tree tomatoes at prices which made growing profitable.

Chinese gooseberries, though introduced just before 1910, did not find favour for many years. The "Journal" of April 1929 stated that the commercial possibilities of this fruit remained to be proved.

Tree tomatoes and Chinese gooseberries subsequently became popular and have become an accepted part of our fruit diet.

The size and quality of Chinese gooseberries have been improved and the selection of superior strains for commercial production is described in the "Journal" of August 1958.

A search for new and improved types of berry fruits was being made early this century at the Weraroa (near Levin) and Waerenga (Te Kauwhata) experimental stations.

In 1947 an impetus was given to berry fruit production by a Dominion-wide survey of berry fruit gardens and the selection and planting at the newly established Horticultural Research Station, Levin, of the various berry fruits, particularly raspberries, black currants, and gooseberries, which had been selected as true to type, good croppers, and free from serious diseases.

The introduction and testing of berry fruit varieties from overseas have been among the main activities of the Levin research station and in January 1959 the "Journal" reviewed the work of the Station and on the subject of improved varieties and strains stated "Among the most notable of the Station's releases are Auchincruive Climax, Talisman, and Merton Princess strawberries; Marcy and Taylor raspberries; Coltswold Cross and Goliath black currants; and Levin Early gooseberry".

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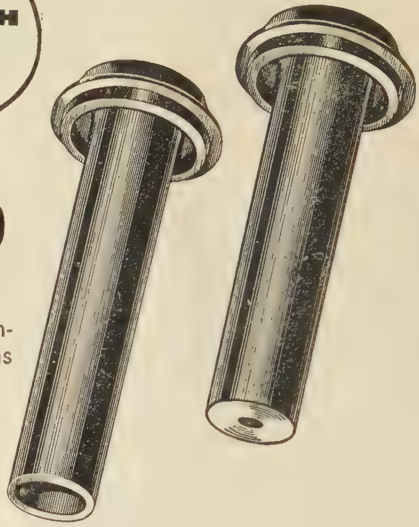

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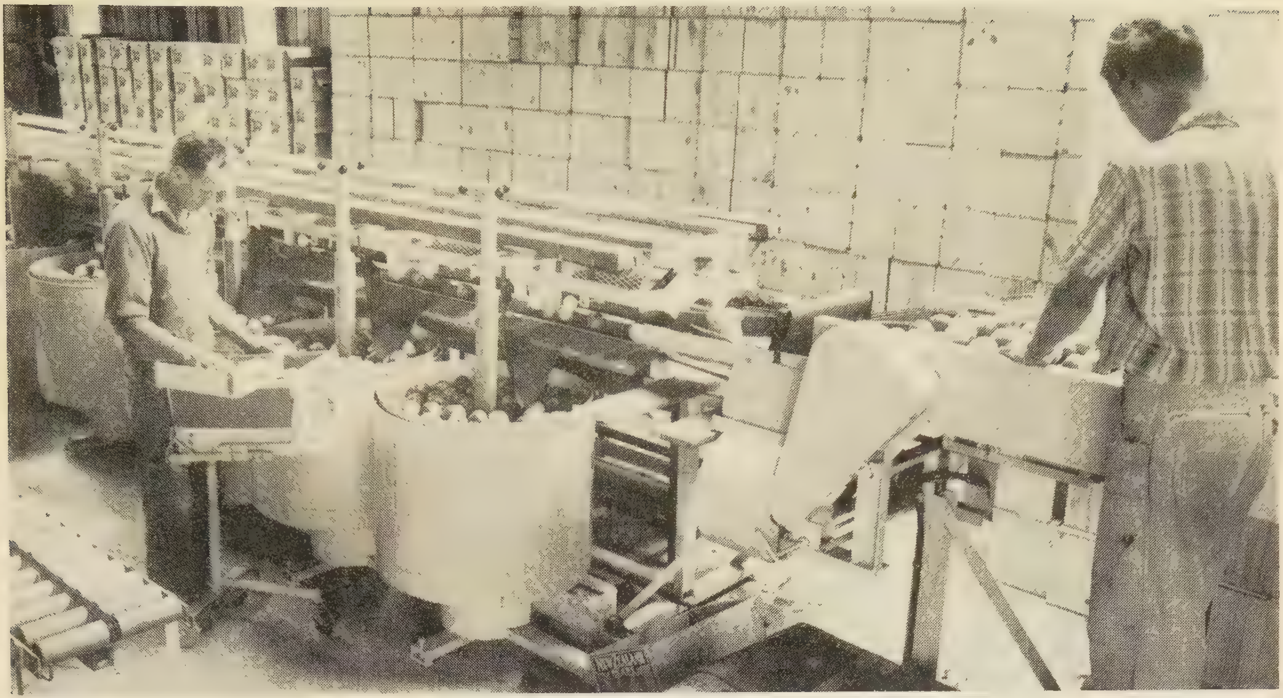


[*Cooper*

▲ This high capacity apple grader can handle 1,200 cases in an 8-hour day. The mobile packing stand shown eliminates lifting of cases.

Perhaps the most significant development in the progress of viticulture in the Dominion over the past 50 years was the introduction and testing of overseas varieties.

Early introductions were principally European, but their susceptibility to disease led to the importation of American European hybrids in 1927.

Disease resistance and reliable cropping characteristics of these hybrids changed the pattern of wine grape varieties. Hybrid varieties at present comprise 62 per cent of the total wine grapes in New Zealand.

The "Journal" of October 1910 contains the first report on the grape variety trials at Arataki and since then numerous introductions have been made bythe Department in the search for varieties most suited to our rather marginal conditions for viticulture.

Tractors and Power Spraying

The advent of the tractor and the introduction of power spraying were important developments in the management of orchards. A report on a tractor for orchards, vineyards, and hop gardens appeared in the "Journal" of April 1914.

With the change from horse-drawn implements to tractor-drawn equipment some damage resulted to fruit trees because of the greater depth to which the heavier cultivating equipment was able to operate when drawn by the more powerful tractor. Many tree roots were cut with resultant loss of vigour and cropping ability. A good deal of damage had been done before the cause and effect were evident.

The introduction of the power spraying machine was a major step in the control of horticultural pests and diseases. The much greater pressures at which sprays could be applied with the power pump resulted in greatly increased efficiency and speed of spraying.

The modern spray outfit, even more than the greatly increased range of modern spray materials, has been responsible for the improvement in pest and disease control that has been noticeable in recent years. Spraying equipment from the early types to the present-day efficient machines is reviewed in the "Journal" of May 1959.

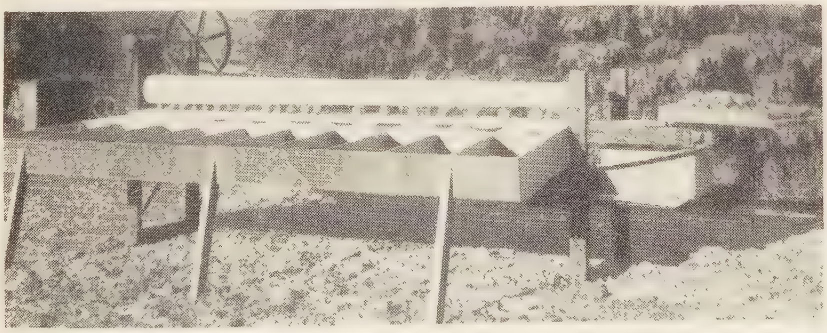
The first power spraying machines were capable of spraying up to 2 acres per day with two men spraying and one man driving the horse-drawn outfit. Present-day outfits spray up to 18 acres per day and require only the tractor driver to operate them.

From the beginning of spray application by hand pumps until after the Second World War the technique of application remained the same. The spray material was diluted in water to a safe concentration and then applied at high pressure through a nozzle designed to form a fine spray. As efficiency of application was increased by higher pressures, the main change over the years was in the development of pumps delivering higher pressures.

"Air-blast" Sprayers

The first change in the techniques of spray application came with the

▼ One of the earliest type of hand operated fruit sizing machines used for grading fruit for export in Nelson district.



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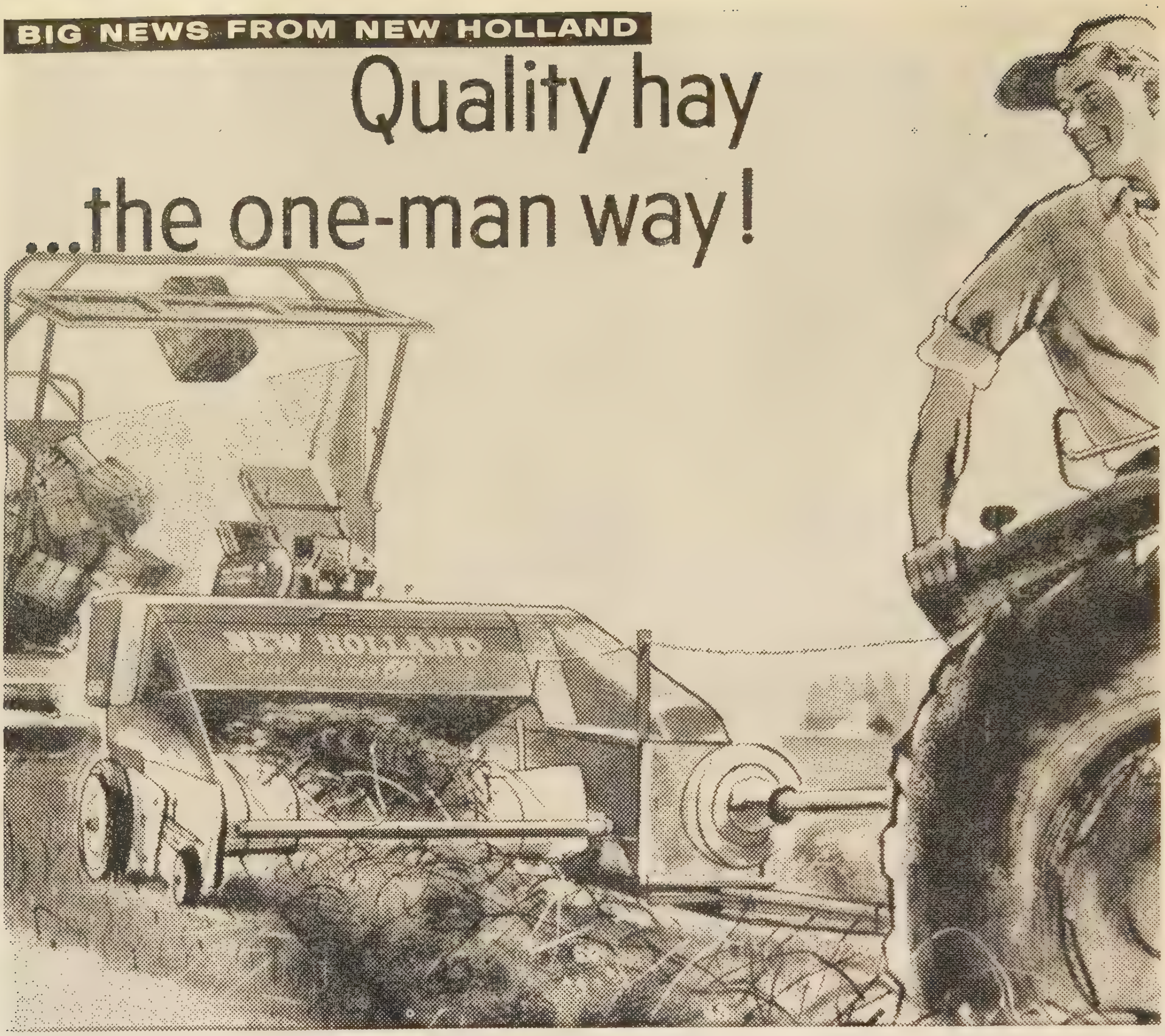

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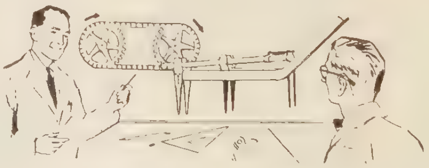

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introduction of the high volume "air-blast" machines. Instead of using high water pressure to atomise and carry the spray throughout the trees, the "air-blast" machines used a high-velocity airstream. A large fan driven by a high-powered engine created a windstream of up to 100 m.p.h. and nozzles delivered the spray mixture at low pressure into this airstream. These outfits are capable of applying 7,000 gallons of spray per day as compared to the 300-gallon output of the first power-driven machines.

Low-volume "Semi-concentrate" Sprayers

Next came the low-volume "semi-concentrate" spray outfits. Whereas with all previous types of spray machines water alone was used as the carrier for the spray materials, the low-volume machines use a smaller quantity of water with air as the carrier. The more highly concentrated spray mixture is delivered at high pressure into a high-velocity airstream which breaks the spray into a fine mist.

The introduction of the modern high- and low-volume machines has considerably changed the technique of spray application. Manpower is saved, spraying time reduced, and diseases generally have been more effectively controlled.

Orchard Soil Management

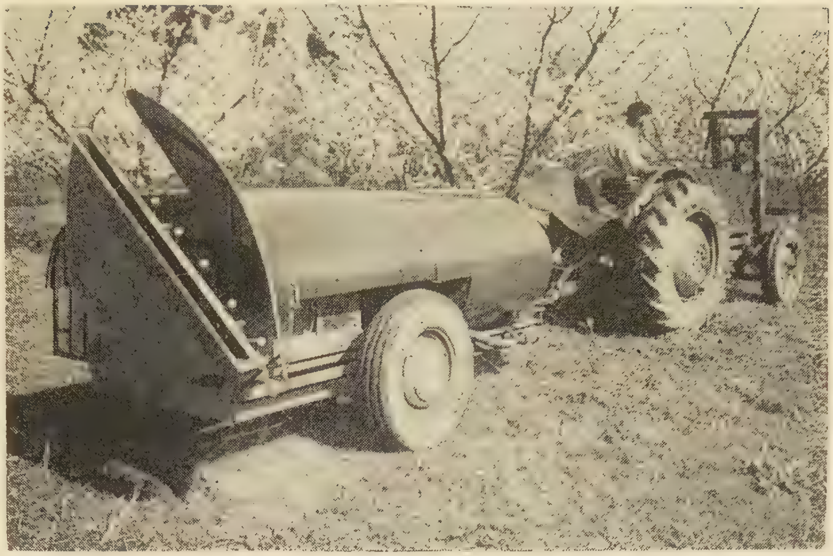
Until about 1948 cultivation in spring and summer followed by an autumn-sown cover crop was the traditional system of soil management in New Zealand orchards. In the "Journal" of December 1910 W. A. Boucher emphasised the value of regular and thorough cultivation in the development of the tree and the production of fruit of good size and high quality. Clean cultivation and the suppression of grass and weeds became the accepted practice in good soil management in orchards.

The "Journal" of July 1912 commented thus on orchard cultivation:

"Fruitgrowers of the Dominion will be interested to know that the principle of thoroughly working the soil of the orchard, which is now generally accepted in this country as essential to the best results, has been proved to be of distinct advantage over allowing grass to grow between the trees (as in the old way of conducting fruitgrowing) by experiments extending over sixteen years conducted at Woburn Experimental Fruit Farm, of England".

Permanent Grassing

In recent years it has been recognised that continuous cultivation damages soil structure, aggravates erosion, and reduces soil fertility. Following the pronounced swing away from cultivation in English orchards in the past 20 years many fruitgrowers in this country have turned to permanent grassing as a means of improving soil condition and fertility.



The use of modern spraying machines has resulted in a saving in manpower and time, and diseases generally have been controlled more effectively.

Many fruitgrowers have turned to permanent grassing of their orchards as a means of improving soil condition and fertility.

The first significant development in this system took place between 1948 and 1950, when several Auckland orchards were sown in permanent grass. The practice has now spread to most fruitgrowing districts and over 2,000 acres of orchards are now in grass.

In the "Journal" of July 1951 T. Conway discusses the need for the addition of humus to orchard soils in Hawke's Bay and outlines some of the methods by which this might be done, including the laying down of orchards in permanent or semi-permanent coverage. At this time few growers in Hawke's Bay were prepared to adopt such revolutionary changes. However, as the years went by more orchards were grassed and by 1957 sufficient local experience had been gained to enable a review to be made in the "Journal" of January 1957 of grassing orchards in the Auckland district.

The review indicated that success had attended the grassing of pip fruit and citrus orchards, but some doubt remained with respect to peach trees. Suggestions are made to aid growers intending to grass their orchards, and the need to mow regularly, particularly during summer and early autumn, is stressed. Attention is also drawn to the need for extra nitrogen during the first few years of pasture establishment.

The "Journal" of April 1959 contains a review of the development of grassed orchards in New Zealand and the prevailing practices with respect to grass mixtures, sward management, and the application of fertilisers.

Orchard Management

Grassing has resulted in conspicuous changes in orchard management and machinery. The plough, disc harrow, and rotary hoe have given way to the rotary mower. Grazing of orchards

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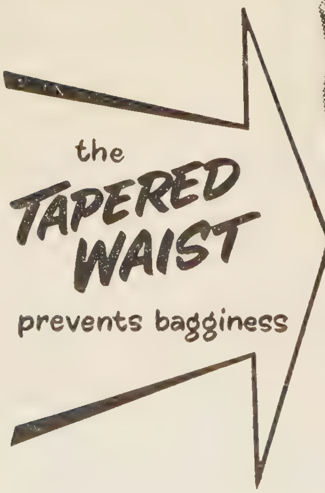
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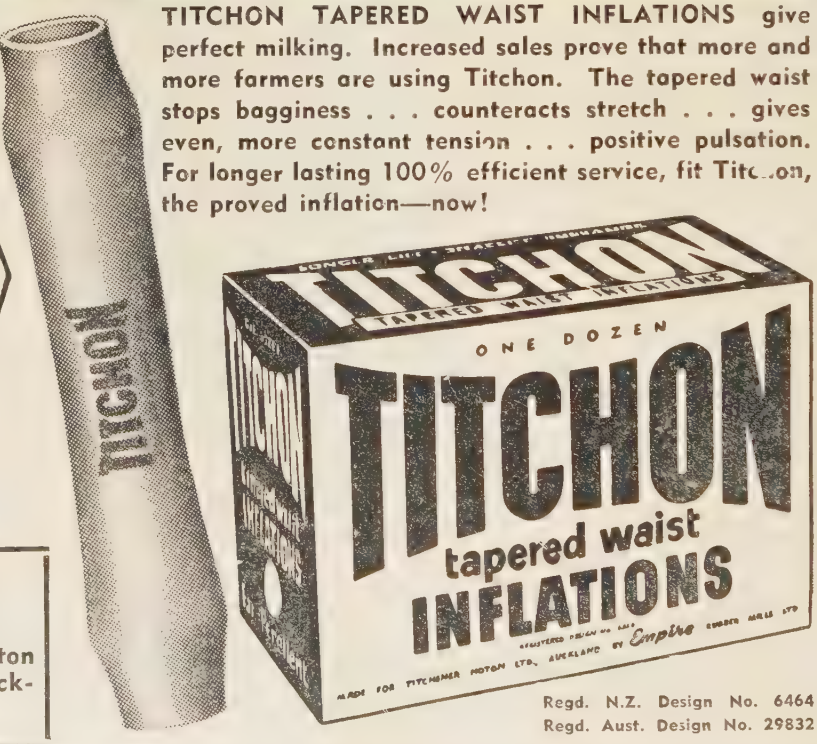
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by sheep is now a common practice during winter. Greater quantities of nitrogenous fertilisers are necessary for the first few years after grassing, but when the clover sward becomes dominant there is little or no need for additional nitrogen.

Though it will be some years before the long-term effect of grassing on tree growth and production can be fully assessed, advantages already observed include the checking of erosion and a better working surface for orchard operations. With correct sward management and adequate manuring orchards have not suffered under grass and many have shown a marked improvement.

Bulk Harvesting

A New Zealand innovation which is now being followed extensively overseas is the system of bulk harvesting of apples and pears. This system was first introduced in 1953 in the Nelson district. In the "Journal" of November 1954 T. Conway describes the first installations of bulk harvesting equipment in Hawke's Bay and in the "Journal" of June 1957 an excellently illustrated description is given of the three main types in use.

Though there are modifications of the system, its essential features are that the fruit is picked into large bins of 35 to 100 bushels capacity which may be permanently mounted on wheels (usually the 100 bushel bins) carried on steel-framed trailers or handled by fork-lift tractors. At the packing shed the fruit is fed from the bin to the grading machine by a conveyor belt and elevator, or the bin itself is lifted to a tilting frame for direct feeding to the grader.

Bulk harvesting eliminates the use of fruit cases in the orchard and packing shed before the fruit is packed, thus saving considerable time and labour; also, with less handling of the fruit in cases bruising is reduced. Most of the Nelson and Hawke's Bay apple crops are now harvested in this manner.

Woolly Aphis

One of the most troublesome orchard pests in earlier years was woolly aphis. The "Journal" of September 1913 referred to Cox's Orange Pippin variety as one of the best for quality, but in many localities so subject to woolly aphis that it was not as extensively planted as it would otherwise be.

Later issues of the "Journal" refer to the seriousness of woolly aphis and many early isssues of the "Journal" give accounts of experiments with different spray materials for its control. There is even an account in the "Journal" of May 1913 of experiments with salt as a spray and as a soil dressing as a possible control. Because of the incidence of woolly aphis on apple tree roots the Northern Spy rootstock, which is resistant to the pest, was introduced and became popular in New Zealand as the principal rootstock for apples.

The introduction in 1921 of the woolly aphis parasite, *Aphelinus mali*, by Dr Tillyard, of Cawthorn Institute, Nelson, and its subsequent establishment throughout New Zealand reduced woolly aphis to a minor problem, and so it remained for a long period. Within recent years woolly aphis has again become troublesome, its increase being attributed to the effect of new insecticides, such as DDT, on the parasite.

In the "Journal" of July 1921 Dr Tillyard outlines the circumstances leading to the introduction of the parasite and describes the liberation of the first few on apple trees in Nelson.

The control of woolly aphis by the parasite *Aphelinus mali* is the major success in biological control of a horticultural pest in New Zealand.

Market Gardening

MARKET gardening about 1910 was concentrated near the main centres of consumption, and production was governed by local demand. Lack of suitable transport prevented surpluses being distributed to other districts.

With improved transport facilities not only was the market gardener provided with a wider market but also with a wider selection of areas suitable for vegetable growing. As a result market gardening began to extend away from the centres of consumption. An impetus to that trend came with the encroachment of housing on many of the near-city market garden areas.

The vegetable processing industry, canning and later quick freeze, has had an immense influence on vegetable production in recent years. The all-year availability of vegetables with only a limited production season has greatly increased consumption and consequently the quantity grown of these kinds.

Quick freezing of vegetables began toward the end of the Second World War and has expanded tremendously. Of 10,000 acres of peas grown for processing in the 1958-59 season, about 45 per cent were for quick freezing.

The increase in vegetable production caused by the processing industry has been confined mainly to certain districts, such as Hawke's Bay, where soil and climate are excellent for peas, beans, asparagus, sweet corn, and other kinds.

Before the establishment of the first vegetable canning and quick freeze factory in Gisborne in 1951, the market garden acreage in that district was under 500; by 1958 it had increased to over 1,600. In Hawke's Bay over two-thirds of the district's 9,000 acres of vegetables are grown for canning and quick freeze.

The principal vegetable growing areas are:

Hawke's Bay ..	9,000	acres
Auckland and Pukekohe ..	10,000	,,
Manawatu ..	2,500	,,
Canterbury ..	2,500	,,
Nelson	2,500	,,

In Poverty Bay, South Canterbury, and Otago the area in market gardens in each district varies between 1,000 and 1,500 acres. (The figures quoted do not include main crop potatoes and onions.)

Articles appear in the "Journal" from time to time on the culture of tomatoes, both outdoor and under glass. The first article on tomatoes (August 1910) advises on raising and growing outdoor varieties. Most of the advice still holds good today, the biggest change being in varieties, those mentioned, Earliana, Sutton's Satisfaction, and Holmes's Supreme) being now superseded.

The New Zealand tomato crop at that time was valued at £10,000 a year; today's annual production is valued at close on £2,250,000.

Despite competition from outdoor crops of tomatoes, glasshouse production has expanded considerably and in the past 10 years the number of growers and the area under glass have doubled. At present there are about 2,700 commercial glasshouse tomato growers with a total of 10,000,000 sq. ft. of glasshouses, of which approximately 4,000,000 sq. ft. are heated.

The changes in techniques during the past 50 years have been in construction of glasshouses, method of heating, soil sterilising, trickle feeding of plants, spray application, and varieties.

In the "Journal" of August 1911 S. F. Anderson wrote comprehensively on tomato culture under glass and recommended a house 24 ft wide, 100 ft long, and with 5 ft high side walls. The walls could be of concrete and could be built up the full 5 ft, or 3 ft 6 in. of concrete with the top 18 in. of glass. Side ventilators 6 in. x 18 in. are recommended at 6 ft. intervals along the house and 12 in. from ground level; ridge ventilation is recommended.

A description of the modern type of glasshouse with 6 ft side walls of glass and full length side and ridge ventilation is given in the "Journal" of January 1950. Two comprehensive articles on glasshouse tomato culture

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in the May and June 1953 issues outline modern practices.

For many years growers experimented with different methods of applying water in glasshouses with the aim of eliminating laborious hand hosing. A grid system of soak tubes for applying water which was described in the "Journal" of October 1951 was claimed to reduce the labour cost and prevent undue wetting or consolidation of the surface of the soil.

A British system of trickle feeding subsequently introduced caused growers some misgivings at this radical change in the method of applying nutrients and water. It has now, however, become widely adopted. A simple method of automatically controlling trickle irrigation under trial at the Horticultural Research Station, Levin, was described in the "Journal" of July 1959.

Glasshouse tomato growers have long been concerned at the deterioration in the soil when the same crop is grown in it repeatedly. Pests and diseases may increase from year to year unless they are controlled by soil disinfection. The "Journal" reported trials on the control of eelworm by chemicals as far back as 1913, but little progress was made in that early period.

In later years carbolic acid, carbon bisulphide, cresylic acid, and formaldehyde were used as soil treatments in glasshouses, but none of these was totally satisfactory and the search for better materials continued. An account of trial work using chloropicrin and Shell DD which appeared in the November 1948 "Journal" clearly indicated the promise of chloropicrin as a soil fumigant and it has subsequently been used extensively, still appearing the most satisfactory chemical available. The method of using chloropicrin for soil treatment in glasshouses is described in the "Journal" of March 1953.

At no time have chemicals proved as effective as heat in eliminating harmful soil organisms, but the expense of the heat method has precluded its widespread use.

Mechanisation has completely changed the field work of market gardening. Horse-drawn equipment was almost solely used in market gardens in 1910. In the April 1913 issue of the "Journal" an article appeared on the "Agrimotor" or farm tractor, and reference is made to the suitability of the smaller models for orchard and market garden and that the horse can be entirely replaced.

Great progress has been made since then in the use of mechanical seeders, planters, cultivators, and harvesters for market garden crops. An account of the mechanisation of onion growing in the "Journal" of March 1949 illustrates the extent to which specialised equipment can be developed for handling certain crops.

[Orr

The vegetable processing industry has had an immense influence on vegetable production in recent years.

Special planting and weeding machines have greatly reduced the dependence on costly hand labour and speeded up the work.

As with fruit growing there has been a tremendous advance in the techniques of disease and pest control in market gardens during the past 50 years.

For many years the knapsack sprayer was the sole spraying equipment on most market gardens, but modern row-crop spraying machines are now common to all large market gardens.

The principle of low-volume semi-concentrate application of spray materials has been adopted for glasshouses by the use of the paint spray gun. An article in the "Journal" of March 1959 describes the equipment in use at the Horticultural Research Station, Levin.

Vegetable varieties are ever changing as new varieties and improved strains are introduced. The "Journal" of October 1910 contains reports on vegetable variety trials at the Waerenga, Ruakura, and Weraroa experimental farms. Such trials have been a regular feature of the work of the Department and reports on them have appeared from time to time in the "Journal".

More recently, attention has been paid to disease resistance in varieties. The "Journal" of February 1957 outlines the development of a wilt-resistant strain of Greenfeast peas, and trials with a newly introduced tomato variety, V548, which is resistant to leaf mould, are reported in the May 1959 "Journal".

The production of high-quality vegetable seed has been encouraged in recent years and a start was made with tomatoes. The system of production of Government approved tomato seed is described in the "Journal" of October 1958 and since then cabbages and beans have been added to the scheme.

Plant Quarantine

THE Department early recognised the importance of protecting New Zealand agriculture from harmful pests and diseases and in 1896 recommended the introduction of an Orchard and Garden Diseases Act. Inspectors of imported fruit and plants were subsequently appointed.

In the "Journal" of February 1951 it was stated: "New Zealand became acutely conscious of the inadequacy of her plant quarantine procedure under modern conditions after discussions on this subject at the Seventh Pan-Pacific Science Congress held in New Zealand early in 1949. Since then the existing laws and regulations enforced have been closely studied."

One of the major improvements in plant quarantine has been the erection of large modern fumigation stations at Wellington and Auckland and the opening of the new Wellington station is featured in the "Journal" of February 1955.

Beekeeping

BEEKEEPING was still a fledgling industry in the 1900s and few beekeepers realised the importance of breeding and keeping an improved strain of bees. Results of an inquiry by the Department into breeding and requeening as factors in profitable beekeeping were published in the "Journal" of September 1910 and revealed the superiority of the Italian strains of honey bee. In later issues the adoption of Italian strains has been consistently advocated with advice on breeding improved strains and the systematic requeening of hives. These practices are now standard among New Zealand beekeepers and have contributed considerably to successful honey production.

With horse-drawn vehicles most beekeepers preferred to operate only one central apiary because of the difficulties associated with horses being stung by bees, but motor transport gave a considerable impetus to commercial beekeeping. It enabled beekeepers to establish out apiaries and exploit better beekeeping areas. A motor-car trailer for moving bees is described in the "Journal" of October 1916.

Before 1906 bees were maintained in all types of hives. A hive of standard pattern was advocated in the September 1913 "Journal". Results of experiments with types of hives and equipment at the Department's apiary at Ruakura were featured in the "Journal" of July 1918. This work pioneered the present general use in New Zealand of the Langstroth 10-frame hive.

A model honeyhouse of the type on which modern plants are patterned was erected at Ruakura Farm of Instruction in the early 1920s. The building and its specifications were described in the March 1922 "Journal".

American foul brood was seriously impeding the profitable keeping of bees throughout New Zealand in 1910. W. B. Bray, in the "Journal" of July 1910 described the causes and symptoms of the disease and measures for its control, the application of which reduced the incidence of the disease until in the 1920s economic beekeeping on a commercial basis became possible.

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Home Gardening

THE "Journal" has been the principal medium through which advice has been given to the home gardener over the past 50 years, the first article appearing in the "Journal" of December 1910 on the pruning and management of grape vines. Regular articles for the vegetable and flower gardener and the home orchardist have done much to raise the standard of home gardening.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers will be given in August as follows:

1YZ Rotorua, 7.15 p.m.

7 September—“Soil Fertility Problems in the Bay of Plenty”, by A. V. Allo, Farm Advisory Officer, Department of Agriculture, Tauranga.

21 September—“Care of Milking Machines and Rubberware”, by J. B. Cockerton, Special Inspector, Department of Agriculture, Hamilton.

1XH Hamilton, 12.33 p.m.

12 September—“Electric Fencing for Hill Country Sheep Farms”, by M. G. Boyer, Farm Advisory Officer, Department of Agriculture, Hamilton.

19 September—“The Huntly Lowlands”, by C. D. May-Somerville, Federated Farmers.

26 September—“Metabolic Diseases of Cattle”, by G. R. Mackintosh, Livestock Instructor, Department of Agriculture, Hamilton.

2XG Gisborne, 8 p.m.

6 September—“Stockowners' Question Time”, by E. B. Smythe, Livestock Instructor, Department of Agriculture, Gisborne.

13 September—“For the Orchardist”, by J. Overbye, Instructor in Horticulture, Department of Agriculture, Gisborne.

20 September—“Lucerne”, by R. S. Whitehead, Fields Instructor, Department of Agriculture, Gisborne.

2YZ Napier, 7.10 p.m.

6 September—“Seed Certification”, by F. H. Collin, Instructor in Agriculture, Department of Agriculture, Hastings.

20 September—“Preparation of Stock for Freezing Works”, by F. D. Usher, Supervising Meat Inspector, Department of Agriculture, Hastings.

2XA Wanganui, 8 p.m.

1 September—“For the Country Women”, by Mary Macdonald.

8 September—Farming News.

15 September—“Rearing 10 Piglets per Litter to 500 lb in Eight Weeks”, by C. M. Bailey, Supervisor, Taranaki District Pig Council, Wanganui.

22 September—“Pasture Seed Mixtures”, by A. A. Duncan, Farm Advisory Officer, Department of Agriculture, Wanganui.

29 September—“Poultry Notes”, by B. J. Russell, Poultry Instructor, Department of Agriculture, Wanganui.

2XP New Plymouth, 8 p.m.

1 September—“News and Views from the Department of Agriculture's Farm Advisory Division”, by G. R. Moss, Farm Advisory Officer, Department of Agriculture, New Plymouth. Y.F.C. session, by David Smith, North Taranaki Y.F.C. district committee.

8 September—“Wool Field Notes”, by P. C. Marshall, Sheep and Wool Instructor, Department of Agriculture, Wanganui.

22 September—“Radio Vet”, by J. H. Macdonald, Veterinarian, Department of Agriculture, New Plymouth.

3YA Christchurch, 12.20 p.m.

19 September—“Review of 'The New Zealand Journal of Agriculture' ”, by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.36 p.m.

5 September—“Lambing Problems”, by C. E. Isaacs, Veterinarian, Department of Agriculture, Invercargill.

12 September “Silage”, by J. G. Richards, Farm Advisory Officer, Department of Agriculture, Oamaru.

19 September—“Shearing and Wool Handling Instruction”, by W. J. Hansen, Sheep and Wool Instructor, Department of Agriculture, Dunedin.

26 September –“Pasture Management”, by T. G. Sewell, Farm Advisory Officer, Department of Agriculture, Gore.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. (“Country Journal”, including “Report from Ruakura”), Tuesdays, Wednesdays, Thursdays, and Fridays at 7.45 p.m. (“Country Journal”), Thursdays at 12.33 p.m. (“News for the Farmer”).

1XN Whangarei, Mondays at 8 p.m. (“Northland Stock Market Report”, followed by “Farming for Profit”), Wednesdays at 8 p.m. (“Farming for Profit”), and Fridays at 12.33 p.m. (“Farm News”).

1XH Hamilton, Mondays at 12.36 p.m. (“For the Farmer”, excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. (“Report from Ruakura”).

1YZ Rotorua, Wednesdays at 7 p.m. (“Bay of Plenty Journal”), Thursdays, 12.33 p.m. (“News for the Farmer”).

2YZ Napier, Tuesdays at 7.10 p.m. (“The Hawke's Bay Farmer”) and Thursdays at 12.33 p.m. (“News for the Farmer”).

2XG Gisborne, Tuesdays at 8 p.m. (“Farm Session”).

2XP New Plymouth, Thursdays at 8 p.m. (“Farm Session”).

2XA Wanganui, Mondays at 8 p.m. (“For the Man on the Land”), Tuesdays at 8 p.m. (“Farm Supplement”), and Thursdays at 8 p.m. (“Farm Topics”).

2XB Masterton, Fridays at 6.45 p.m. (“Farm Session”).

2XN Nelson, Thursdays at 8 p.m. (“Nelson Farm Topics”).

2ZA Palmerston North, Mondays at 12.36 p.m. (“Country Digest”), and Fridays at 8.30 p.m. (“Country Digest”, including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. (“Farm Session”), Thursdays at 12.33 p.m. (“News for the Farmer”).

3YA Christchurch, Mondays at 12.20 p.m. (“Country Session”), Thursdays at 12.33 p.m. (“News for the Farmer”), and 7.10 p.m. (“Home Paddock”).

3XC Timaru, Wednesdays at 8 p.m. (“Farmers' Weekly News Service”), and Saturdays at 10.30 a.m. (“Country Mailbag”).

3YZ Greymouth, Mondays at 12.36 p.m., Thursdays at 12.33 p.m. (“News for the Farmer”).

4YA Dunedin, Mondays at 12.36 p.m., Wednesdays and Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.36 p.m., Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m. (“News for the Farmer”).

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Invercargill Venue of Grassland Conference

THE 1960 conference of the New Zealand Grassland Association will be held in Invercargill from 8 to 10 November. On the first day Department of Agriculture officers will read papers on the farming problems of Southland and the relationship between nutrition and stock health; there will be other papers on the soils of Southland, tussock land development in the Te Anau area, and the work of the Grasslands Division of the Department of Scientific and Industrial Research at Gore.

The evening will be devoted to an address by the President, Dr P. D. Sears, and talks on grassland farming overseas by delegates to the 8th International Grassland Congress in England.

Visits to three Southland farms will comprise the field day of the conference. The third day will be devoted to scientific papers and reports by delegates to the International Congress.

A three-day tour of the Te Anau-Manapouri-Milford Sound area is being arranged for after the conference.

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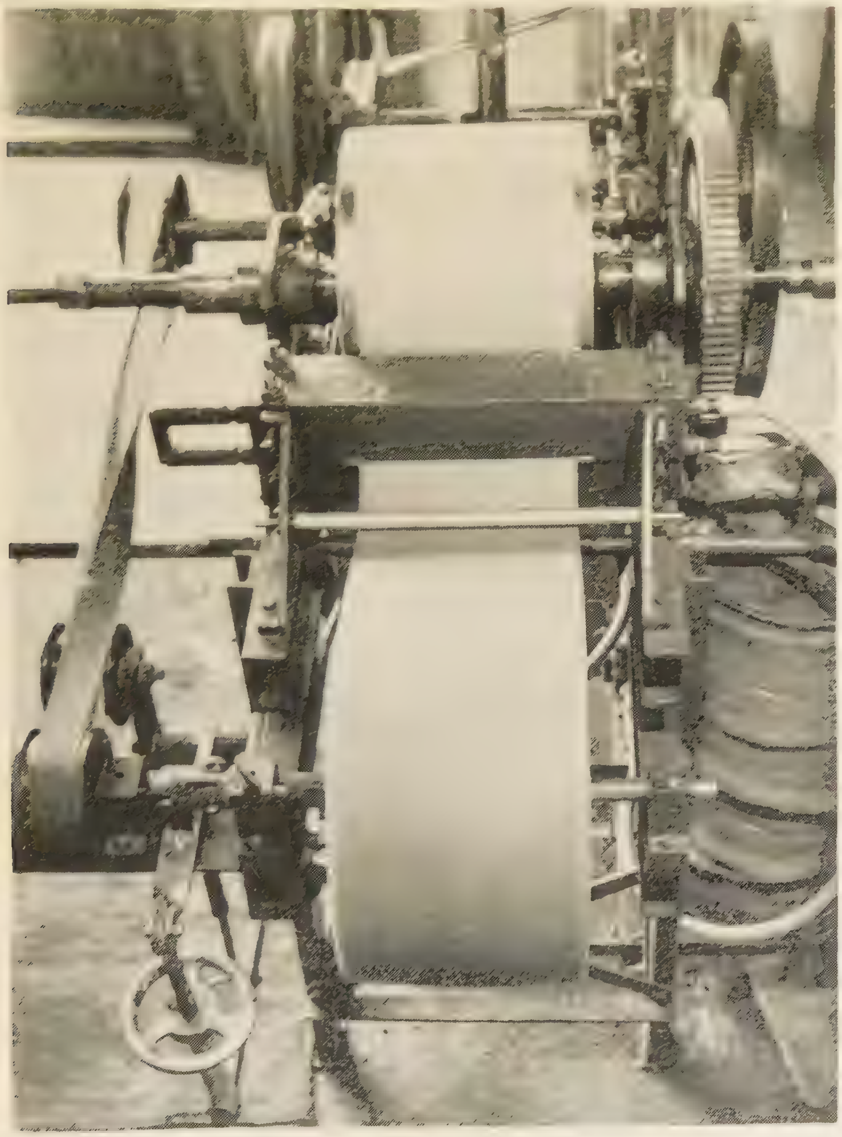
Processed Bee Comb Foundation

THE gradual development over the past 100 years of a process for the manufacture of a satisfactory form of comb foundation has made possible the present world-wide extension of commercial beekeeping. Though comb foundation is essential to modern beekeeping practice and is now in universal use, the principles of its manufacture remain unknown to many beekeepers. In this article a modern comb foundation manufacturing plant using the improved Weed process is described.

By D. ROBERTS,
Apiary Instructor,
Department of Agriculture,
Auckland



After the crude wax has been melted, thoroughly filtered, and solidified in moulds, it is processed in the Weed sheeting machine. Here it is melted again, picked up by a water-cooled rotating roller on which it solidifies into a sheet, and fed directly into a tapered die $\frac{1}{8}$ in. wide at the exit. The pressure which builds up in the die compresses the molecules in the wax, greatly increasing its tensile strength, and forces it through in a continuous sheet $\frac{1}{8}$ in. thick.

AS first made by Mehring of Germany in 1857, comb foundation was an extremely crude product. It was not until 1875 after further development of the original process by Wagner, the King brothers, Weiss, and finally A. I. Root and A. Washburn, that a satisfactory comb foundation became commercially available. Further improvement to the process followed through the development in 1895 by E. B. Weed of a wax sheeting machine which could produce wax sheets of any length and of absolutely uniform thickness. The Weed process, with improved filtering and refining of the crude wax, is still the basis of modern comb foundation manufacture.

Before the advent of comb foundation, beekeeping on anything other than a relatively small scale was most laborious and was greatly limited. The development of a comb foundation manufacturing process after the invention of the movable frame by Langstroth and the honey extractor by Hruschka made commercial beekeeping practicable on a scale hitherto impossible.

From what was largely a part-time occupation of farmers and small holders, commercial beekeeping has now developed to a stage where it provides a full-time living for many beekeepers in most Western countries. Apart from the many tens of thousands of tons of honey produced annually, the production of beeswax and other products is of considerable commercial importance. This universal expansion of an ancient craft has also provided countries dependent on pastoral and horticultural industries with a widespread insect pollination service.

Combs Naturally Haphazard

Before comb foundation was developed beekeepers had little or no control over the way in which bees built combs. They built them as and when needed and according to their own designs, so that the combs were of various shapes and sizes, were often joined together, and always contained a large proportion of drone comb. The presence of large amounts of drone comb meant that great numbers of

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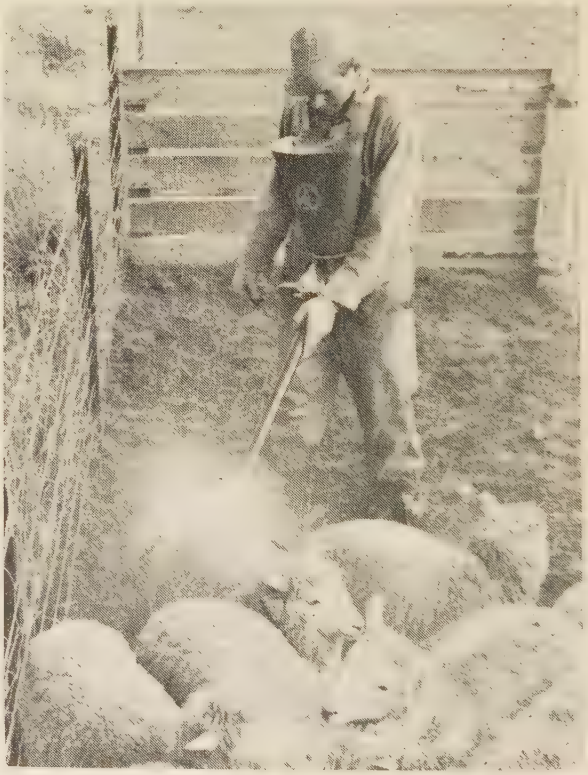
Livestock: Control of keds and lice, protection from blowfly strike, and treatment of struck sheep.
Weeds: Control of winged thistle, variegated thistle, ragwort.

General: Control of fleas around dog kennels and outbuildings, larvae of the cattle biting fly (S. calcitrans) around ensilage stack bottoms, housefly larvae in compost and manure piles on farms, piggeries, freezing works, etc.



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drones would be raised and there would be a consequent serious drain on the food and labour resources of the colonies.

Processed Comb Foundation

The use of comb foundation has brought many advantages to beekeepers, the most important being the production of straight combs which permit rapid manipulation of colonies, easy removal of honey from the supers, a great saving of honey and labour by the bees in the construction of combs, the control of a desirable population of worker bees, and much easier inspection for the presence of brood diseases.

Comb foundation is a sheet of pure beeswax embossed on both sides with the bases and beginnings of the cell walls of the comb of the honey bee. These cell bases are made to worker bee size, as a sufficient population of drones is always provided by small areas of drone cells which the bees will build in the bottoms and corners of the combs.

Two Grades of Foundation

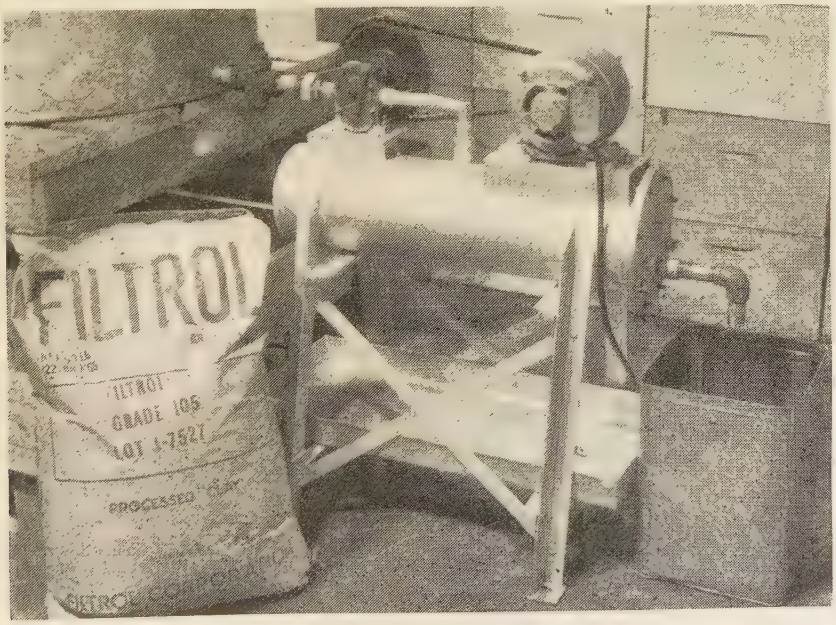
In New Zealand comb foundation is usually made in two weights or grades, known in the trade as thin super and medium brood. Thin super is made from very thin sheets of wax embossed with an extra thin cell base and light side walls and is used exclusively for the production of comb honey as sold in sections, half frames, or in small pieces cut and wrapped. The use of thin super foundation encourages the bees to build combs containing much less wax in the midrib than normally. The delicate friable wax of such combs is much more attractive to the human palate than that of the coarser combs which would be built without its use.

Medium brood is a much heavier grade of foundation which is given to the bees for the building of combs which are to be used for brood rearing and extracted honey production.

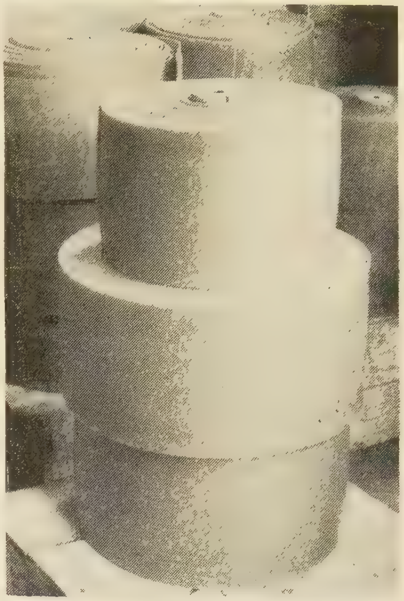
The manufacture of comb foundation of good and consistent quality is a highly technical process requiring precision machinery. Because of the high standard of workmanship, technical knowledge, and considerable financial outlay required, its manufacture is generally concentrated among the larger bee supply organisations and a few individuals specialising in the trade.

Manufacturing Process

Bee combs deteriorate in use and beekeepers, to maintain efficient production, must constantly cull combs which have become damaged or are otherwise unsuitable and eventually they are melted down and the wax content reclaimed. Because the combs of the honey bee are the sole source of pure beeswax, which is used for many commercial purposes apart from the manufacture of comb foundation, other waxes of vegetable or mineral origin should not be added to beeswax used in foundation manufacture.



At the first stage of manufacture into comb foundation the crude wax is melted down in a steam-heated tank (upper left corner) and then in liquid form passed through a pressure filter in which diatomaceous earth is used as a filtration agent. After it has solidified it is processed in the Weed sheeting machine shown on page 193.



The sheeted wax is rolled on to wooden cores and left for about a fortnight so that it can become thoroughly annealed before embossing.

Grading and Filtering

Before the crude wax is melted down preparatory to manufacture into foundation it is sorted into grades of colour, the darker yellow and brown shades being separated for use in making the heavier medium brood foundation and the lighter yellow being used for thin super for comb honey production. The wax is melted down in a steam-heated container and in liquid form it is passed through a pressure filter using diatomaceous earth as a filtration agent. This highly efficient filtration system removes all traces of propolis and pollen and other extraneous matter from the wax and helps to retain much of its natural odour, at the same time making the final product much more dense and pliant.

The initial melting of the crude wax is done with boiling water and steam. When the wax is thoroughly melted the steam is turned off and the wax allowed to settle for a few minutes, then skimmed to remove any coarse fragments of wood which may be present. Sufficient diatomaceous earth to ensure good filtration with proper colour retention is added and thoroughly incorporated in the liquid wax. Excess water is drawn off from the base of the melting tank and the wax pumped through the specially constructed filter at a pressure of up to 80 lb per sq. in. By this thorough filtration a dense, bright, clean wax is produced. From the filter the wax flows continuously into moulds and it is left in the moulds for 48 hours or more until it is completely solidified. It is now ready for further processing in the Weed sheeting machine.

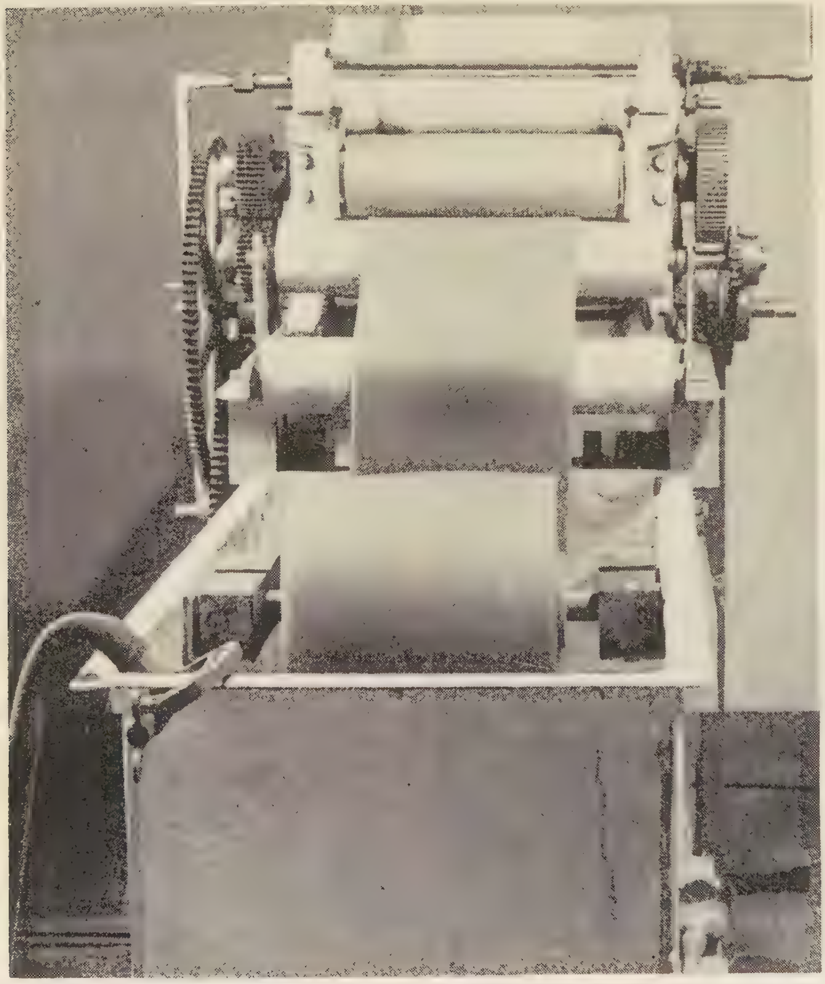
Sheeting

When ready to be converted into sheet form the blocks of wax are placed in a steam-heated melting tank at the head of the sheeting machine and then subjected to a controlled temperature of 180 degrees F until it is again thoroughly liquefied. The melted wax is fed into another heated reservoir in which is fixed a stainless steel revolving drum, with its lower part submerged in the wax and cooled by cold water flowing constantly through it. The drum rotates and as it does, it picks up a thin film of the molten wax about 1/32 in. thick. Carried round on the drum the wax is rapidly cooled and in one half turn of the drum it has solidified into a sheet. The sheet is peeled off the drum by a fixed heated knife and fed by the rotation of the drum directly into a heated die held by thermostatic control at a temperature of 110 degrees F.

The opening in the die is 8 in. wide and tapers from ¼ in. in depth at the mouth to ⅛ in. at the exit. The soft wax sheet builds up in the mouth of the die until there is enough pressure to force the wax through the tapered opening and it emerges from the die in a continuous sheet ⅛ in. thick. The high pressure in the die compresses the molecules of the wax and so greatly increases its tensile strength.

Annealing

As it leaves the die, the sheeted wax is rolled on to wooden cores. The rolls of wax sheeting are stored for 14 days or more so that the wax can become thoroughly annealed before embossing. Annealing helps to toughen the sheet wax preventing distortion of the cell base and side wall pattern as it passes through the embossing rollers.



When the rolls of wax sheeting have thoroughly annealed the sheets are passed through the embossing machine. The embossing rollers must be very skilfully and accurately engraved and their manufacture is confined to only one or two firms in the world.

Embossing

When the annealing is completed the wax sheets are passed through the embossing machine. The rolls of wax with their wooden cores are placed on an axle, and the free end of the wax sheet is led under a plain roller submerged in a tank of warm water held at a temperature of 105 to 110 degrees F. Passing under another roller, the slightly softened sheet of wax is fed between the embossing rollers where the pattern of the cell bases and the beginnings of the side wall are impressed into the wax.

The embossing rollers are made of a comparatively soft metal and must be very accurately engraved. The manufacture of these rollers is a highly technical process calling for the greatest possible skill and accuracy in engraving and is confined to only one or two firms in the world.

The rollers are set one above the other with the lower one constantly immersed in a cold solution of soap and water which prevents the wax sheeting from sticking to the rollers as it is embossed. The upper roller is hand fed with the soapy solution. The space between the embossing rollers can be adjusted so that the thickness and weight of the foundation can be controlled.

Because of the different requirement of thickness of cell base and side walls needed in thin super foundation as compared with the heavier medium brood, separate, differently engraved embossing rollers must be used for each type.

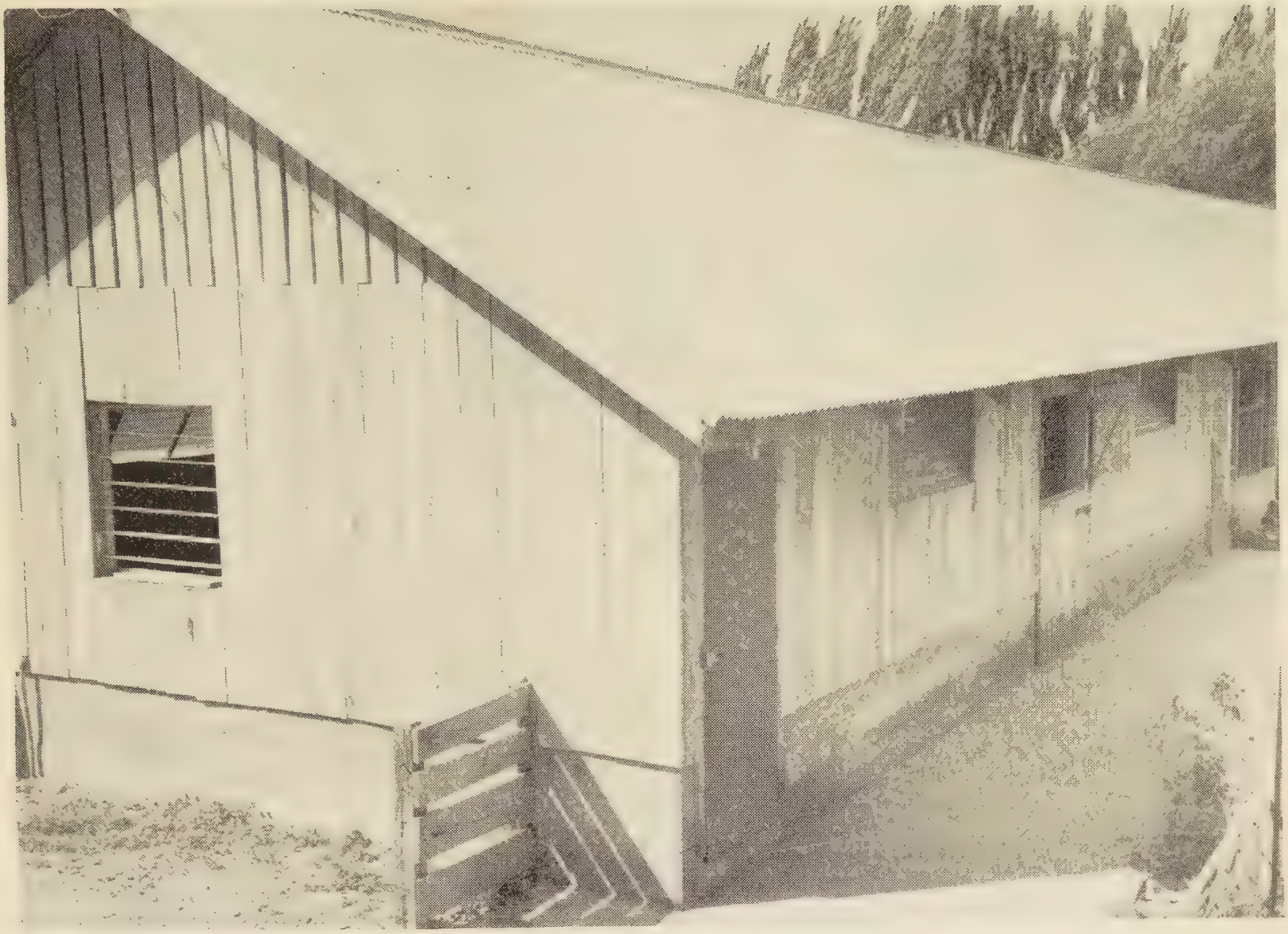
Cutting and Packing

After passing through the rollers the embossed sheet of wax is carried by an endless rubber belt to a mechanically operated guillotine where it is cut into the correct lengths for fitting into the frames. This is the final process and after leaving the guillotine the foundation is carried away by the belt to be packed into cases for delivery.

Though the manufacture of comb foundation is largely mechanical, the operator must have a sound technical knowledge of the chemistry of beeswax and the effects of heat, pressure, and tension during processing if a consistently high-quality foundation is to be produced.

Acknowledgment

The technical information and access to their plant given by Pullins Apiaries Limited are acknowledged.



This view of the house shows the access race, stable type door to central feeding passage, hopper and louvre windows, and spaced vertical boards in gable above ceiling height.

Efficient Farrowing House for the Larger Piggery

THE farrowing house described in this article by A. Longwill, Advisory Officer (Pig Husbandry), Department of Agriculture, Wellington, was designed to incorporate the overseas practice of using farrowing crates. In this instance, however, the crates were built into a single, special house, enabling all farrowings on a large piggery to be centred in one place. Designed and built by Messrs J. W. Risi and Sons at their Mountley Stud piggery, near Ngaruawahia, the house has been used for over a year with excellent results.

ON the average New Zealand dairy farm with five or six sows there is strong preference for general-purpose houses, which after use as farrowing quarters can house the litter up to, say, porker weight at least. However, on the larger piggery, where at certain times of the year eight to 10 sows may be farrowing each week, a special "maternity home" has much in its favour:

1. It facilitates management, as someone is able to be on hand at critical moments.
2. Effective control of the farrowing sow is possible with the minimum of inconvenience.
3. The sow and litter are better insulated from the vagaries of the weather than is practicable with small units.
4. Supplies of special food supplement (bran, etc.) used for sows at this time can be kept handy, as can emergency supplies of equipment and drugs which may be required.
5. Fostering pigs from sows with large litters on to sows with few pigs is facilitated.

The main disadvantages are considerable shifting of sows with small litters and the need for higher sanitation standards than are necessary where individual farrowing units are to some extent isolated.

The farrowing house at Mountley Stud was designed largely on the basis of Mr Risi's own European farming experience. An aim was to stabilise temperatures in the building at between 65 and 75 degrees F and this

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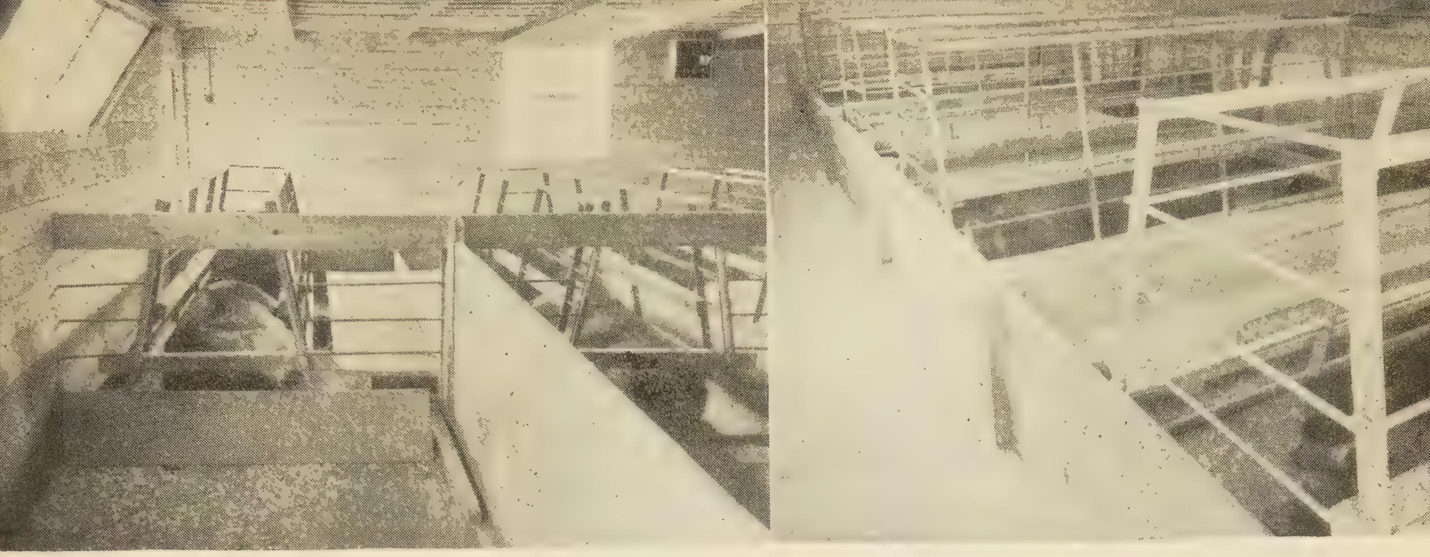


Left—One range of pens from the central passage, showing the layout of the pens and the ceiling construction. Right—One range of crates from the front passage.

has been achieved. Covers over an area adjacent to each sow's crate keep the litter in a warmer atmosphere than that of the main house.

General Layout

The house was designed to contain eight pens, the layout of which, in a totally enclosed building, will be clear from the ground plan at right and photographs above. It will be clear from the exterior and interior general views that construction of the 21 ft span by 40 ft long house is fairly simple and inexpensive.

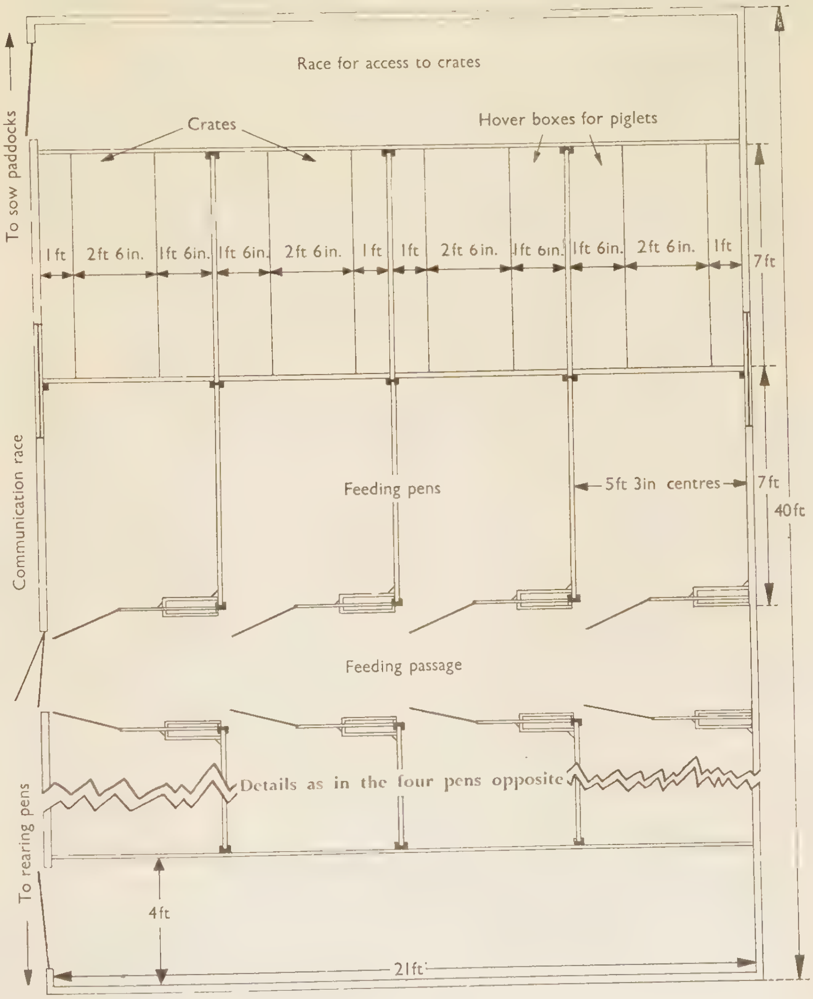
Above 2 ft dwarf walls of reinforced concrete the walls (braced on the inside with horizontal 6 in. x 1 in. pine and sheathed on the outside with vertical 8 in. x 1 in. pine boards up to ceiling height) give an eaves height of 7 ft. The roof has a pitch of about 35 degrees and rises to about 15 ft at the ridge.

Insulated Ceiling

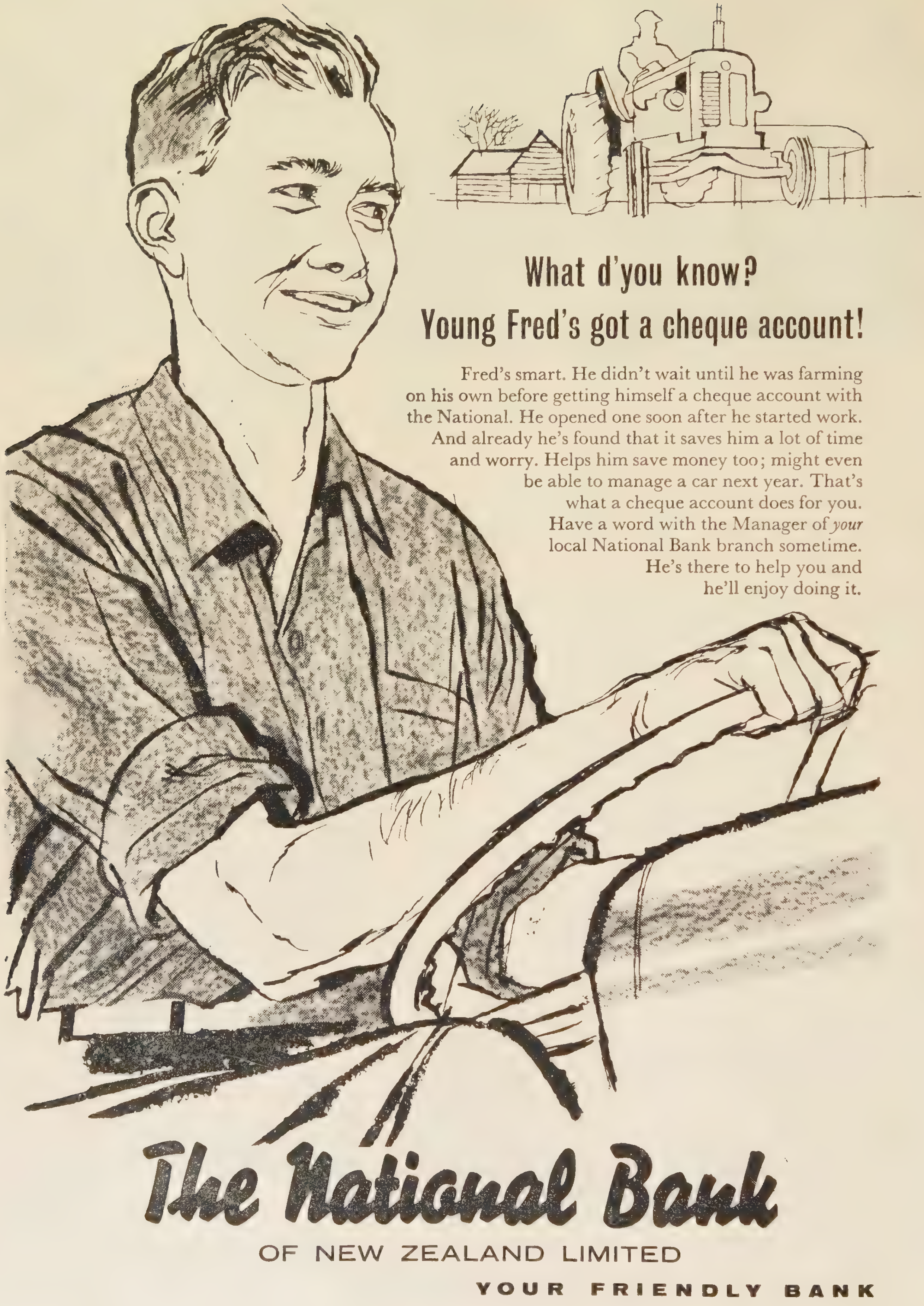
One of the most interesting features in the design of the house is the ceiling. This is of "hit-and-miss" boarding which carries, over a layer of scrim, 6 in. of wood shavings as an insulating layer. It would be an advantage in preventing mould damage if both scrim and the timber from which the shavings came were treated with copper salts. There is a large air space above the layer of shavings.

Ventilation of this space is provided by 1 in. spacings between the vertical boards in the gable ends of the house (see illustration on page 197).

This type of ceiling appears to work very well, limiting loss of heat and allowing adequate ventilation to keep the house fresh and "sweet".


To sow paddocks
Race for access to crates
Crates
Hover boxes for piglets
1 ft
2 ft 6 in.
1 ft 6in.
1 ft 6in.
2 ft 6 in.
1 ft
1 ft
2 ft 6 in.
1 ft 6in.
1 ft 6in.
2 ft 6 in.
1 ft
7 ft
Communication race
Feeding pens
5 ft 3in centres
7 ft
40 ft
Feeding passage
Details as in the four pens opposite
To rearing pens
4 ft
21 ft

Ground plan of the farrowing house.



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Lighting

There are 2 ft 6 in. x 2 ft louvre windows in each end of the house and hopper windows made of 5 ft corrugated translucent sheets on either side (see illustrations at the top of page 199). Adequate ventilation can be provided in hot weather by opening all the windows and outside doors. The house always gives the impression of being well lit, fresh, and airy. Artificial lighting is provided so that sows may be attended to conveniently at any time.

A thermometer suspended inside has recorded that in hot weather temperatures are about 10 degrees F lower than those outside; in cold weather the house temperature seldom falls below 60 degrees, if all pens are occupied by pigs.

Ground Plan

The ground plan on page 199 and photographs of the interior make a detailed description of the interior layout unnecessary. Passages are provided at each end of the house along the front ends of the four crates, which are placed alongside one another. These passages, together with the central passage, which is also used for feeding, provide access to the crates and hover boxes from either end.

Usually the sow and litter are attended to from the passage along the front of the crate. From this passage the lids of the hover boxes can be lifted as shown in the illustration on page 202 so that an attendant can get right alongside the sow.

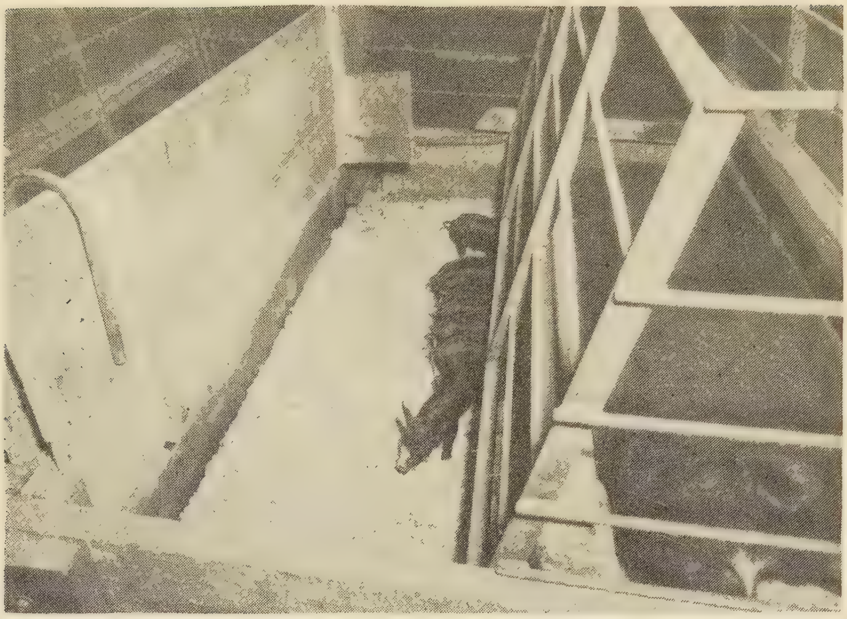
Pens are 5 ft 3 in. wide; the crate and the feeding yard are each 7 ft long. The crate, which is of welded steel, is a little to one side of the centre line in each compartment. This permits more space for the hover on one side, but allows safe areas below the bottom rail of the crate on either side.

Each unit drains toward the gate communicating with the central feeding passage. Drainage is trapped in this passage and led out under the floor to the main drainage system. These under-floor sewers, which are flushed out by hoses daily, have proved entirely satisfactory. A 2 ft length of 9 in. diameter glazed tile liner provides all the trough required in a unit of this type.

Management

Stock are moved by the central passage to a particular compartment. After it has been cleaned and disin-

UPPER—Rear view of crate with the boards which are used at farrowing in position. LOWER—A pen with sow and litter a few days after farrowing. The sow's trough is alongside the feeding passage in the foreground.



Looking into the hover area from the front passage. The lids of adjacent hover areas when raised are held by a U bolt (left).

fected the pen is allowed to dry out thoroughly before the sow is brought in a few days before farrowing so that she becomes accustomed to her quarters. A shallow bed of shavings is provided in the crate and hover box and the sow normally uses the crate whenever lying down.

When farrowing is imminent the attendant places a 9 in. x 1 in. board across the rear of the crate to prevent newly born piglets wandering away from the sow and a length of 3 in. x 2 in. timber above this to prevent the sow backing out of the crate (see the upper illustration on page 201). The cover over the hover box is then lowered and all is in readiness for farrowing. Human aid is seldom required.

After the first day the board is removed from the back of the crate, as by then the piglets have found that the most comfortable place is on the bed under the hover. No artificial heat is used in the hover box.

The sow is fed lightly at first and later the amount of feed is increased gradually. After three or four days, if the pen is required for another pig, the sow and her litter are moved to a unit in which they can have access to a grass run and which includes a creep.

* * *

Pedigree Pig Improvement Scheme: Qualified Litters

By the Animal Industry Division

THE following table sets out particulars of litter performance, growth-rate, and carcass quality points for those litters which have qualified in the Pedigree Pig Improvement Scheme for publication since those appearing in the October 1959 issue of the "Journal".

	Breeding of litter							Carcass test results (average) points									
Owner	Sire	Dam	Date born	Litter weight at 3 weeks	Dead weight	Growth rate	Length	Back fat Shoulder	Loin	Bal.	Ham	Sh.	L.	B.	M.	Total points
				lb	lb	(25)	(20)	(10)	(20)	(5)	(15)	(10)	(10)	(5)	(5)	(125)
						Class A Baconers										
H. J. Hurford and Son	LW 15934	LW 16003	3/7/59	151	142	6	16	8+	18+	3	11	8	8	5	5	88
N.Z. Pig Pro. Council	LW 15513	LW 14759	15/5/59	138	139	12	18	6+	19—	5	10½	7	6½	4½	4½	93
N.Z. Pig Pro. Council	LW 15513	LW 14236	4/5/59	98	127	11½	16½	4½+	18+	5	9½	6	6½	5	5	87½
N.Z. Pig Pro. Council	LW 13098	LW 13556	4/5/59	95	129	13½	13	4½+	18½±	4½	10½	7	7½	4½	5	88½
						Class A Porkers										
								Maximum points	(15)						(10)	
G. C. Yeates ..	LW 16239	LW 16369	30/12/59	106	76	23	15	9½+	12—	5	9½	6½	5½	4½	10	100½
G. C. Yeates ..	LW 16239	LW 16782	20/12/59	111	72	15½	14	8½+	10½—	5	10½	8	7½	4½	10	94
G. C. Yeates ..	LW 16239	LW 15452	24/12/59	141	80	23	20	8—	12½—	5	10	6½	6½	4½	10	106
G. C. Yeates ..	LW 16239	LW 16366	15/10/59	91	110	21½	19½	0+	13+	5	12½	7½	6½	3½	8	97
G. C. Yeates ..	LW 16239	LW 15772	24/11/59	142	93	25	15	3½+	10½—	5	9½	4½	5½	5	6	89½
G. C. Yeates ..	LW 16239	LW 16681	6/11/59	109	109	25	20	4½+	9—	5	9½	6	7	2½	6	94½
Attwood Bros. ..	LW 14870	LW 14927	20/11/59	100	63	12½	16½	9½+	9—	5	10	6½	6	2½	10	87½
N. M. and F. S. Clark	WS 276	WS 272	8/5/59	100	81	11½	20	7½—	9½—	4½	7½	7	8	3	9½	88
C. I. Wright	LW 13590	LW 14336	15/10/59	118	80	16½	16	8—	11—	5	11½	8	6½	5	10	97½
C. I. Wright	LW 13590	LW 15799	12/8/59	109	106	19½	20	8½—	13+	5	14½	8½	7½	3½	8	108
C. I. Wright	LW 13590	LW 14336	20/5/59	156	93	16½	17½	9½—	10+	4½	12½	7	7	4	9	97½
						Class B										
B. G. and W. D. Dron	B 32662	B 32602	20/10/59	100	76	16½	16½	4½—	9+	5	10	5	7½	5	7	85½
						Class C										
B. G. and W. D. Dron	B 32662	B 32601	26/10/59	89	82	20½	16½	5½+	11+	5	9½	7½	8	5	8½	97

+ Points lost because too much fat. — Too little fat. L. Loin development. B. Belly thickness. M. Marketing points.

The Large White boar Yelverton East Earl 16239 qualifies under the rules of the scheme as a merit sire.

The Large White boar National Dwight 13590 qualifies under the rules of the scheme as a merit sire.

With What Measure Do You Mete?

By ELEANOR COUSTON,
Home Science Instructor,
Department of Agriculture,
Christchurch

A rounded tablespoon

A knob of butter

A generous teacup

One scant pound of flour

Two cakes of chocolate

THESE are a few examples of the many anomalies found in published recipes which must cause confusion to all but the authors. The more venturesome cooks may take a chance with doubtful recipes, delight in success when their luck is in, and philosophically accept the failures which result from the wrong interpretation. Though a skilled cook might produce better results than her less experienced neighbour, it is certain that explicit recipes would reduce the hazards for both.

SKILL is acquired through practice, but accurate measurements and correct temperatures and timing are essential for uniform results in cookery. The cook of long standing may be sufficiently well acquainted with her own household utensils to manage without the aid of scales or standard measures, but this does not apply to the beginner.

Her breakfast cup may be an ounce or two larger and her tablespoon considerably smaller than that of the kind friend who gave her the recipe for the magnificent cake. She may also feel slightly exasperated by the fact that the same kind friend casually mentioned that she usually adds a little extra butter or some unlisted ingredient. Her chances of success are reduced before she begins.

The Need for Standardisation

In New Zealand there is a growing awareness that there is a need for some standardisation for the measurement of ingredients and for the type of pattern which recipes should follow. To accomplish this successfully would require the cooperation of teachers, publishers, broadcasters, and women's organisations. It has been accomplished in other countries, notably the United States where standards have been set and adopted universally.

The main differences between British and American standards arise from the fact that the capacity of the pint measure varies between the two countries. The British Imperial pint is 20 fl. oz. and the American pint is 16 fl. oz., and so a British standard measuring cup is 10 fl. oz. and the American cup is 8 fl. oz. Sets of measuring spoons vary also, the British spoons being slightly larger than the American and including a dessertspoon which is not used in American cookery.

Another basic difference is that British recipes are usually given in weights and American recipes give measures except for large quantities or for such foods as meat or solid fats which do not pack readily.

The use of accurate scales is a reliable means of determining quantity, but household scales are expensive and because most American recipes are stated in measures, as also are small quantities in any type of recipe, for example spoonfuls, the need for standard cups and standard spoons is obvious.

Methods of Measuring

Different results may also be obtained when different measuring techniques are used so as well as standard-sized measuring utensils, there is a need for standard instructions on how to measure. For instance, the method of measuring flour in the United States is:

"Sift flour once, place lightly into measuring cup with spoon or scoop until the measure is overflowing. Do not shake the cup. Level the flour with the straight edge of a spatula or knife."

The weight of one cup of flour measured in this way compared with the weight of the same cup dipped into a bag of unsifted flour, shaken down, and levelled may give a difference of at least an ounce.

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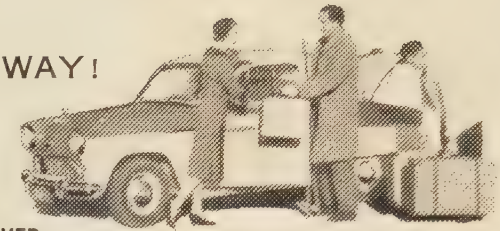

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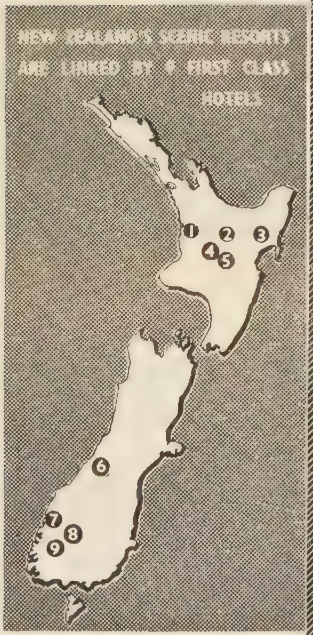
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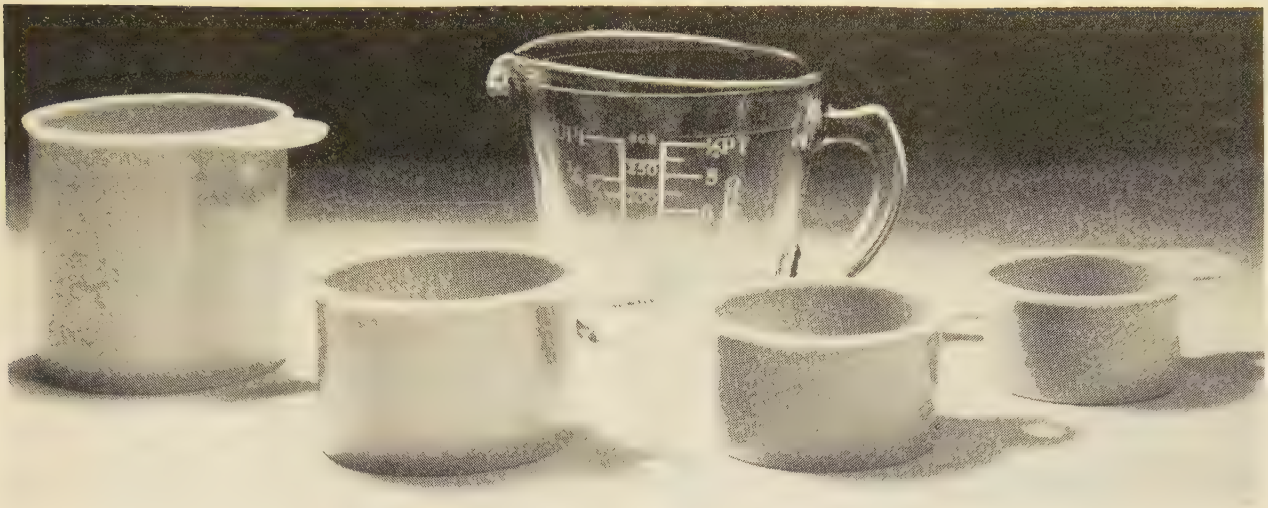
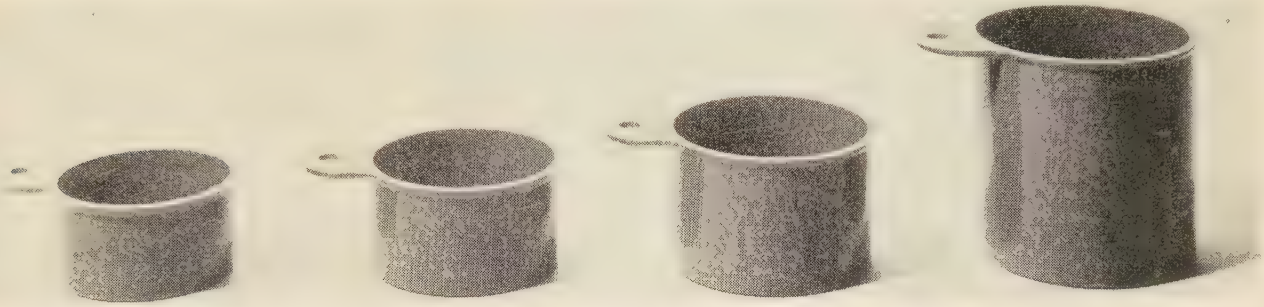


▲ A set of English measuring cups and a jug calibrated to the Imperial pint measure (20 oz).

▼ A set of American measuring cups and a jug (lower right) calibrated to the American pint measure (16 oz).



Temperatures and Times

A further means of reducing cookery hazards is by stating temperatures and times of cooking. There is an optimum temperature at which all foods should be cooked and it should be given with the recipe. Times may vary slightly depending on the insulating properties of the oven, but an indication of the approximate time required should be given. In some cases a method of testing for "doneness" should also be given.

Sizes of Tins

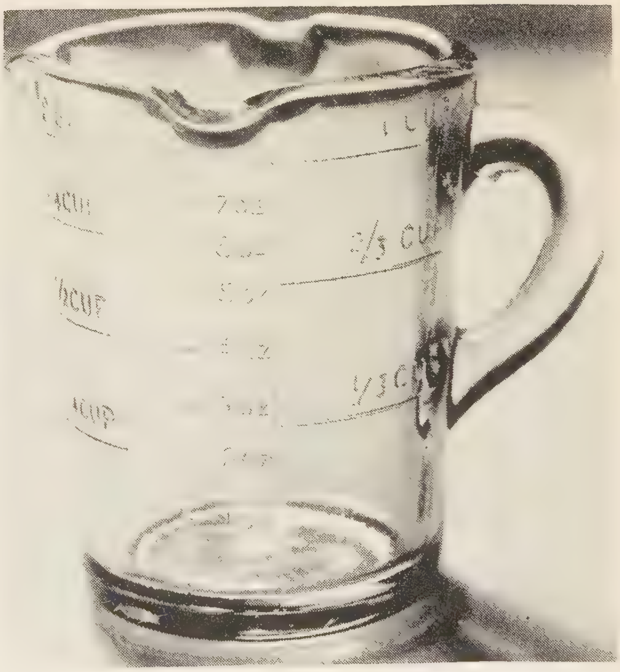
The sizes of tins used for baked products vary considerably and it is extremely helpful to less experienced cooks if the correct size of tin to use with a particular recipe is specified.

Yields

It is also desirable to state the yield, that is, the number of servings which may be expected from a recipe. Opinions may differ as to what makes up a serving, but a statement such as "makes 4 1-cup servings" added to a recipe for soup, for example, is a good guide for quantity.

Toward Standardisation

Until further research is done and standards set for adoption in New Zealand, possibly the best course is to ensure that all recipes published should be stated in weights or should specify the size of measure to use.



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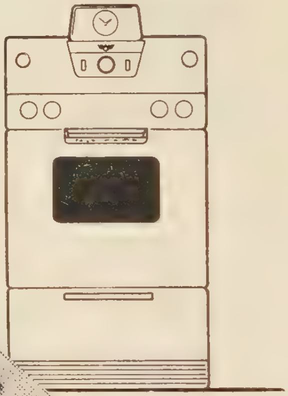

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COOKING MEASURES

The following extract from the "Second 'Journal of Agriculture' Cookery Book" will serve as a guide until definite steps are taken toward standardisation:

> Accurate weighing or measuring of ingredients is important for uniform results in cookery. Because ordinary household cups and spoons vary considerably in capacity, the recipes . . . are stated either in weights or standard measures.

EQUIPMENT DESIRABLE FOR MEASURING VOLUME

Cups

One or more 8 oz measuring cups graduated in thirds and quarters.

In fluid measures an 8 oz cup equals half an American pint, not half an Imperial pint.

An American pint equals 16 oz of fluid or 2 cups.

An Imperial pint (the size of a New Zealand pint milk bottle) is 20 oz or 2½ cups.

Spoons

A set of measuring spoons ranging in size from ¼ teaspoon to 1 tablespoon.

HOW TO MEASURE

Liquids

All liquids should be measured in an 8 oz graduated measuring cup. The 1-cup mark is slightly lower than the rim of the cup. The cup should be on a level surface and then read at eye level to obtain an accurate liquid measure.

Dry Ingredients

As sets of nested measuring cups for quarter, half, and whole 8 oz cups are difficult to obtain in New Zealand, the same type of 8 oz cup which is used for liquids is recommended for measuring dry ingredients when scales are not available. A check should be made to avoid confusion with sets of 10 oz measures.

Flour

Flour should be lifted lightly with a scoop or spoon into the measuring cup and levelled to the required mark with as little shaking down as possible. If the recipe calls for "sifted" flour, the flour should be sifted before being measured.

Sugar

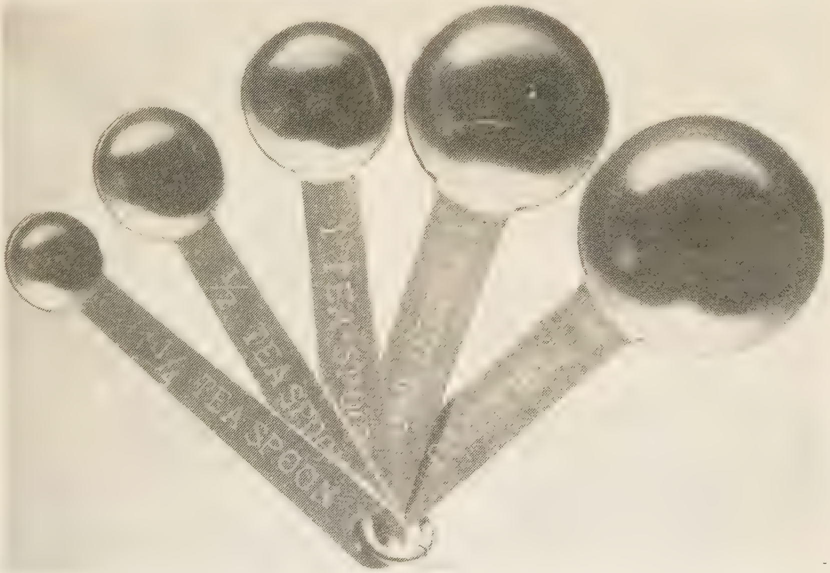
Granulated sugar is measured in the same way as flour by lifting it with a scoop or spoon and levelling it with as little shaking down as possible.

Icing sugar should be sifted before measuring.

Brown sugar is packed firmly into the cup and levelled off.

▲ The capacities of household teaspoons and tablespoons vary from each other and from standard measuring spoons.

▼ English standard measuring spoons are slightly larger than the American (shown at top above) and include a dessertspoon.



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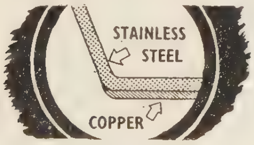

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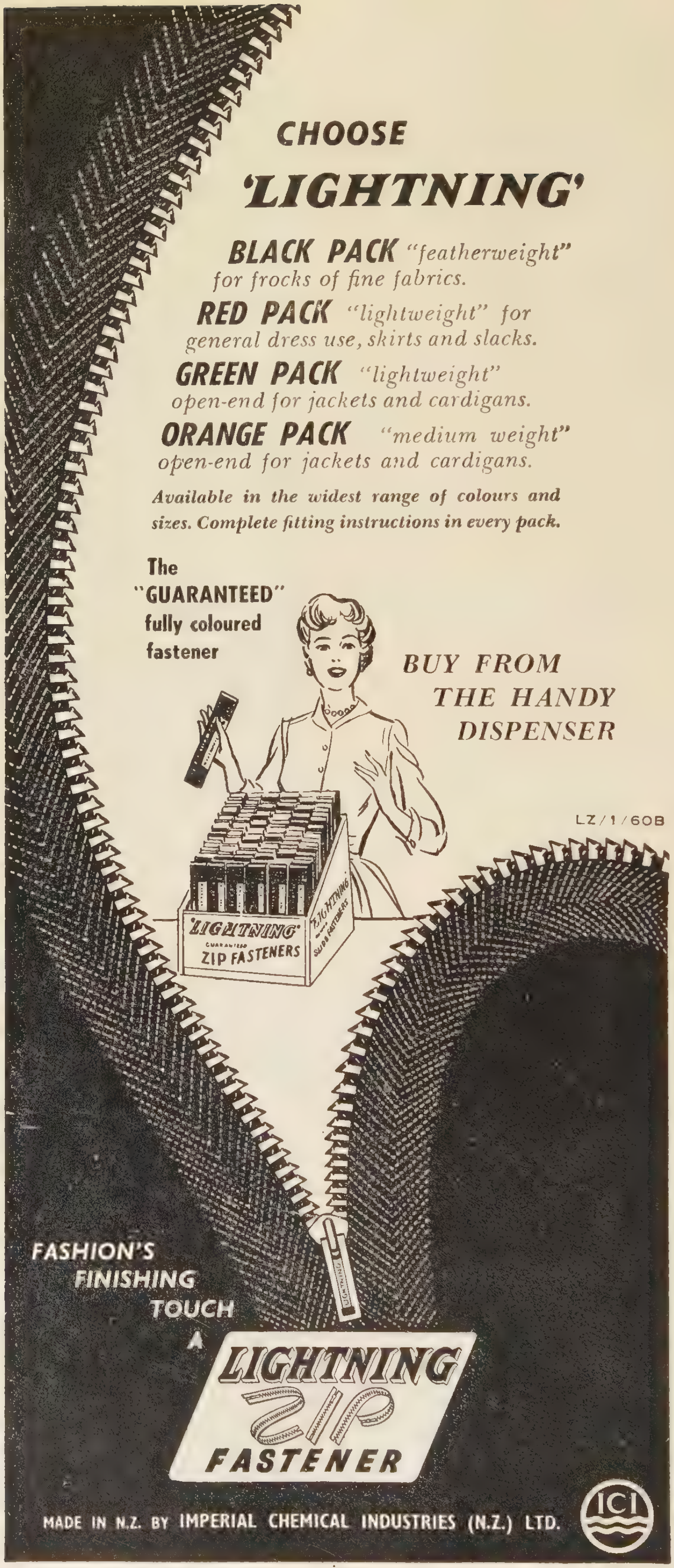

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ICI

The capacities of household tea and breakfast cups often vary considerably.

Butter and Solid Fats

Butter and other solid fats are measured either by packing firmly into a measuring spoon or cup and levelling off or by the water displacement method. To measure fat by the displacement method, pour cold water into a cup up to the measure which will equal one cup when the desired amount of fat is added. For example, if 4 oz (or ½ cup) of fat is required, fill the cup with water up to the 4 oz mark, then add fat until the level rises to 8 oz. The fat should be entirely covered with water. Drain off the water and there will be 4 oz of fat in the cup.

Baking Powder, etc.

Baking powder, salt, cream of tartar, cornflour, gelatine, etc., are measured by dipping a measuring spoon into the container and levelling off with a spatula or straight-edged knife. (Baking soda must be crushed to remove all lumps before being measured.)

COMMON MEASUREMENTS IN COOKERY

3 teaspoons = 1 tablespoon
4 tablespoons = ¼ cup
8 tablespoons = ½ cup
16 tablespoons = 1 cup
1 gill = ¼ pint

WEIGHT AND VOLUME MEASUREMENTS OF INGREDIENTS COMMONLY USED

1 cup = 8 oz measuring cup
All measurements are level

	Weight of 1 cup (approx.)	Cups per lb (approx.)
Bran	2 oz	8
Breadcrumbs, fresh	2 oz	8
Butter	8 oz	2
Cheese, grated	4 oz	4
Cocoa	4 oz	4
Coconut	2½ oz	6¼
Cornflour	4½ oz	3½
Currants	5 oz	3¼
Dates, pitted and cut	6 oz	2¾
Flour, sifted	4 oz	4
Flour, unsifted	5 oz	3¼
Golden syrup	12 oz	1⅓
Honey	12 oz	1⅓
Oatmeal	5½ oz	3
Raisins	5 oz	3¼
Rice	7½ oz	2
Rolled oats	3 oz	5⅓
Sugar, brown, tightly packed	7 oz	2¼
Sugar, granulated	7 oz	2¼
Sugar, icing, sifted	4½ oz	3½
Sultanas	5 oz	3¼
Walnuts, chopped	4½ oz	3½

Weight of 1 level (measuring) Tablespoon

Butter	½ oz
Cocoa	¼ oz
Flour	¼ oz
Gelatine	⅓ oz
Sugar	½ oz

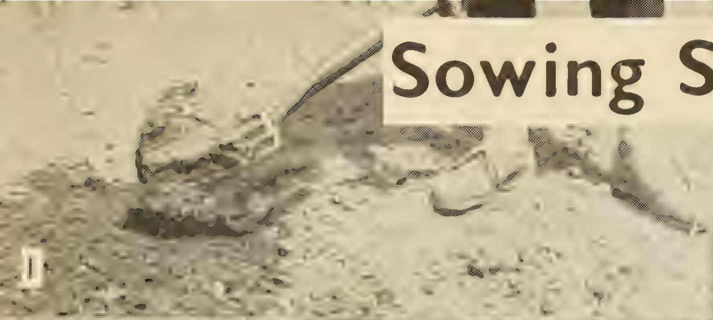
ULTIMATE OBJECTIVE

The ultimate objective should be to establish a means of ensuring that recipes are infallible so leading to improvement in results however inexperienced the cook. Many who have managed successfully over the years with their household measures may not wish to adopt new methods, but standardisation would open a wider field to the younger generation and remove the trial and error element from cookery.

To achieve this the following points might be considered by some of New Zealand's influential women's organisations:

1. What standards should be adopted?
2. Sets of measuring cups and spoons of standard size should be readily available.
3. The information must be disseminated.
4. Only those recipes which conform to the standards established should be accepted for publication.

Sowing Seeds Outdoors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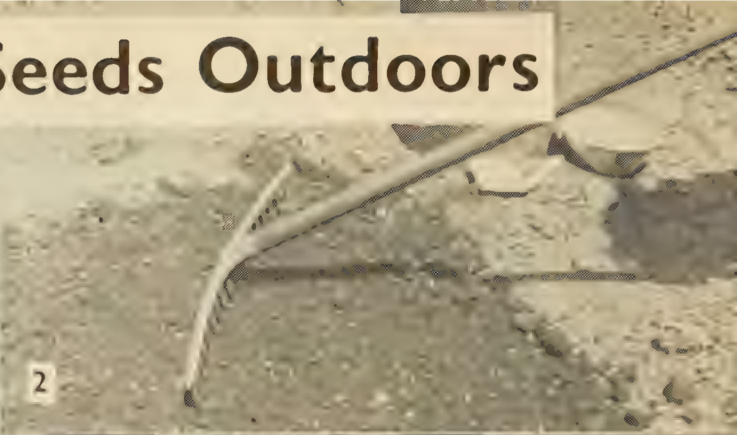
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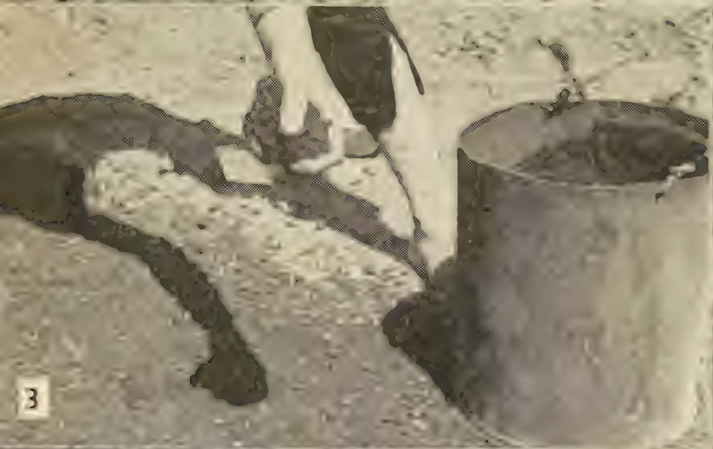
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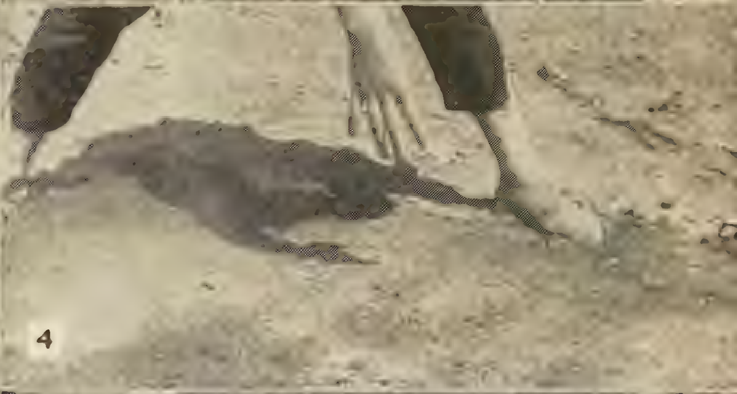
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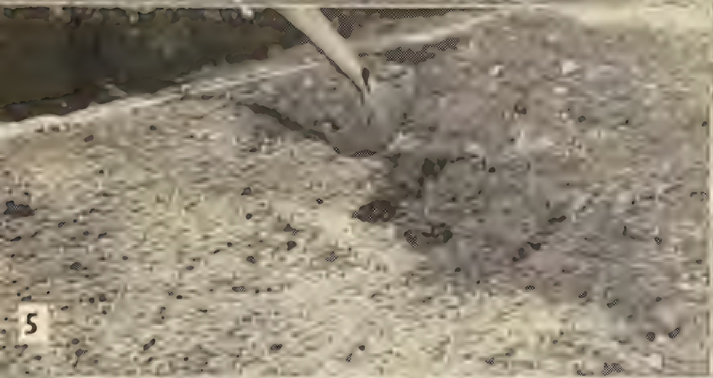
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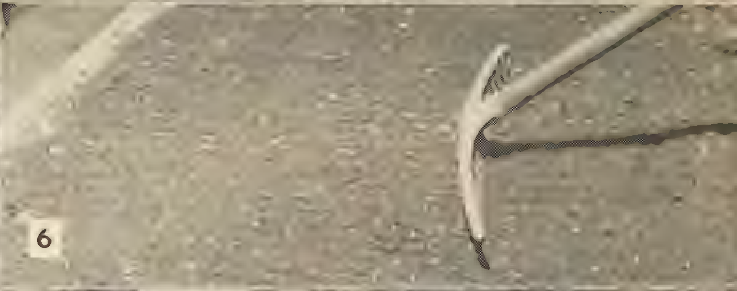
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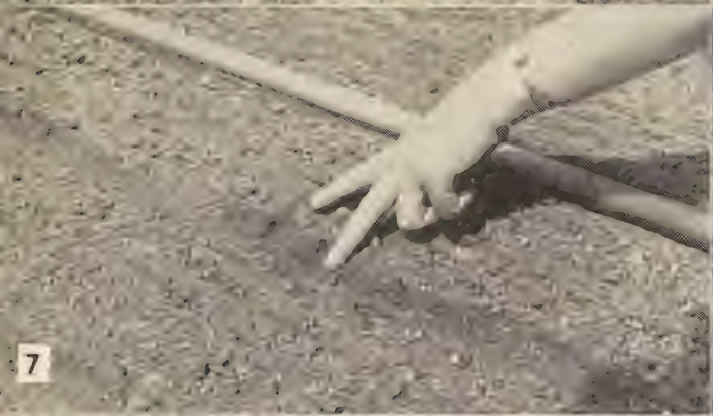
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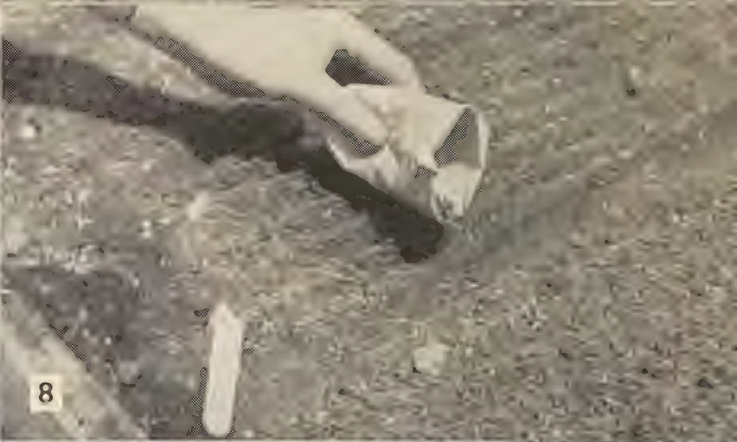
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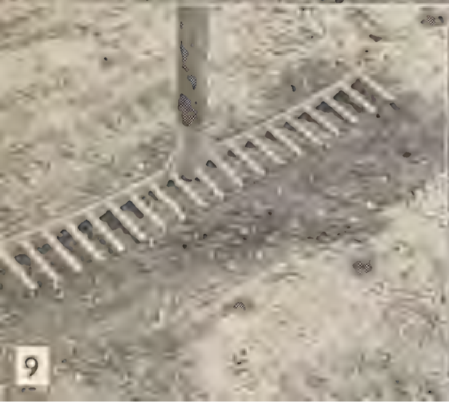
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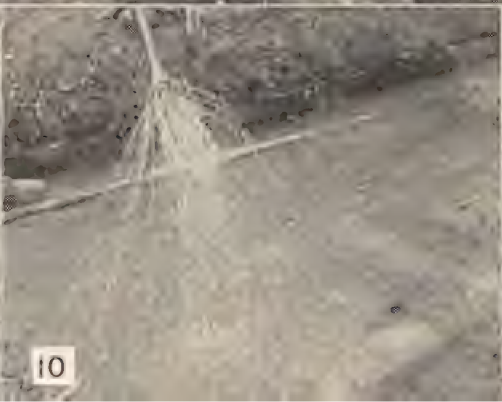
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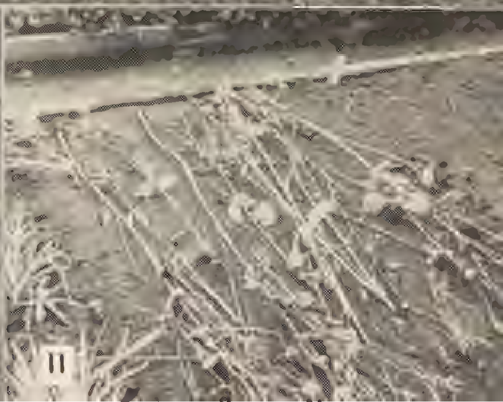
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Raising Plants from Seed in Flower Garden

By J. P. SALINGER,
Horticultural Advisory Officer
(Ornamentals),
Department of Agriculture,
Wellington

BY raising plants from seeds not only will the gardener be able to grow the types and varieties which are best for the garden but this may be done at a fraction of the cost of buying the same plants. In addition to growing plants for bedding displays the gardener can also raise many perennial plants or even trees and shrubs from seed. Though the trees and shrubs may not be as fine as selected named varieties propagated vegetatively, many species come true from seed.

TO germinate satisfactorily seeds need warmth, air, and moisture, and after germination will require light. In addition the soil should be free from all harmful pests and diseases which can attack germinating seeds or seedlings and should preferably be free of weeds, which compete strongly with the seedlings. The soil should also have an adequate nutrient level to encourage satisfactory growth of the seedlings.

Soil Sterilisation

Good fresh seed normally germinates well, but garden soil frequently contains pests and diseases and there may be many weed seeds present. Ideally soil in which seeds are sown should be sterilised. This is possible only where no other plants are growing and can be carried out in empty frames or beds or in soil used for seed boxes. There are two methods of sterilising soil—by heat and with chemicals. Gardeners raising many plants from seed in boxes or frames are well advised to buy special equipment for sterilising soil by heating.

ILLUSTRATIONS OPPOSITE

1. Forking over the compacted soil with a long handled border fork.
2. Raking the soil to break down clods and remove stones. In the background are a bucket of sifted compost, a bowl containing mixed fertiliser, a packet of seeds, and a label with the name of the plants.
3. Spreading sifted compost over the soil.
4. Scattering fertiliser evenly over the soil.
5. Working the compost and fertiliser into the soil with an inverted push hoe.
6. Raking the soil to a fine tilth and an even surface.
7. The seed will be sown in drills. The drill is made by placing a hoe or rake handle on the soil and gently moving it to and fro. The drills are spaced at regular intervals by stretching the fingers between the drills.
8. Sowing seeds thinly in the drill. The label is inserted before the seed is sown.
9. The soil is drawn back over the drill with the back of the rake and then firmed by lightly pressing the rake along the covered drill.
10. In warm dry weather the seedbed may need watering with a fine rosed watering can. Heavy watering will tend to compact and seal the surface.
11. If the weather is hot, the seedbed may need shading with thin cut branches or stems of herbaceous plants.

Sterilisation can be done by pouring boiling water over the soil and then covering the area with clean, damp sacks. This will kill many weed seeds and reduce soil pests and diseases. Two chemicals can be used by the home gardener for soil sterilisation—formalin, which is mainly a fungicide, and vapam, which is a fungicide and will also kill weeds.

Rates of use for soil for boxes or frames are formalin, 2 fl. oz. to ½ gallon of water, and vapam, ½ fl. oz. (1 tablespoon) to ½ gallon of water, for 1 bushel of soil.

For soil outside for 12 sq. ft. use formalin at 1 pint to 5 gallons of water and vapam at 5 fl. oz. to 5 gallons of water.

Both materials should be applied in the open, as the fumes can cause discomfort in a confined space.

After treatment with formalin or vapam the soil should be covered with clean, damp sacks to retain the chemical; two days for formalin and a week for vapam. The sacks should then be removed and the soil turned with a clean tool until the fumes have disappeared. The pots or boxes in which sterilised soil is to be put must be thoroughly cleaned; otherwise the soil can immediately become infected with disease organisms from particles of soil remaining in the boxes.

Even if the soil is sterilised, it is best to dust the seed before sowing with a suitable fungicide to protect the germinating seed or seedlings from soil fungi. Thiram, captan, and copper oxychloride are all suitable for this purpose. The simplest method is to open the seed packet, dip the tip of a plant label into the fungicide and drop a small quantity on to the seed, close the seed packet, and then shake it. This will cover all seeds with a layer of fungicide.

Apart from soil-borne diseases, cats and birds can often disturb the seedbed. Pepper dust sprinkled round the edges of seedbeds has been found to repel cats, while birds can be discouraged by strands of black cotton stretched on low stakes across the bed.

Methods of Sowing

Flowering plants are raised from seed in three ways:

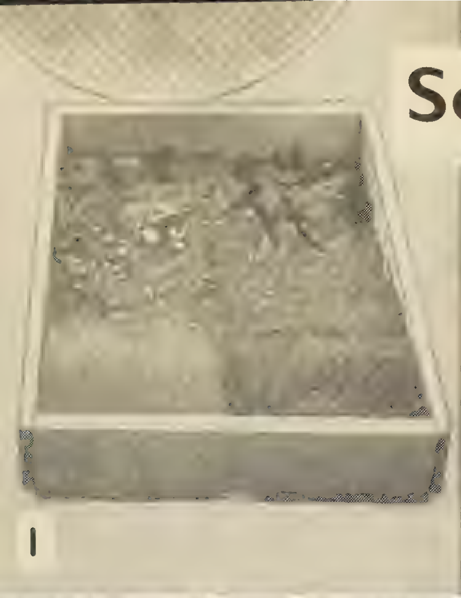
1. Sown outdoors in the position where they are to flower; for instance, spring and summer flowering annual plants.
2. Sown in frames or raised beds for subsequent pricking out and growing on; usually done with plants to be set out in autumn and perennial plants.
3. Sown in boxes or pots and then pricked out; done with plants raised from small seeds or those which require extra care in the early stages of growth.

1. Sowing Seeds Outside

When the seed is to be sown outdoors where the plants are to grow subsequently the soil must be in good condition. It should be well drained with adequate organic matter and supplied with a general fertiliser. The site should be prepared as in the series of illustrations on the opposite page.

In spring the soil will usually be moist enough, no additional watering being necessary, and it will not need protection from excessive heat, but if seed is sown from October onward in most areas it is advisable to shade the area with thin branches of brushwood or dried herbaceous plant stems. Seedlings may be thinned out in two stages: (1) an initial thinning out and weeding as soon as the plants can be handled and (2) a final thinning out to leave the plants at the distance at which they will flower.

Sowing Seed in Boxes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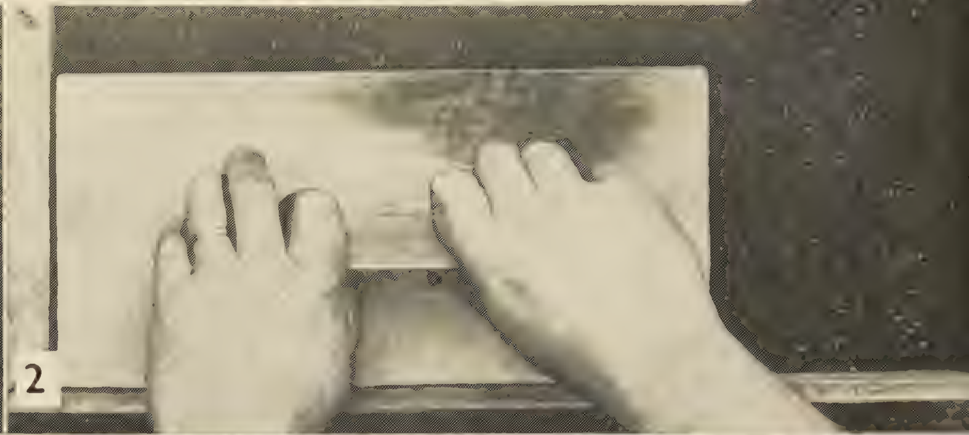
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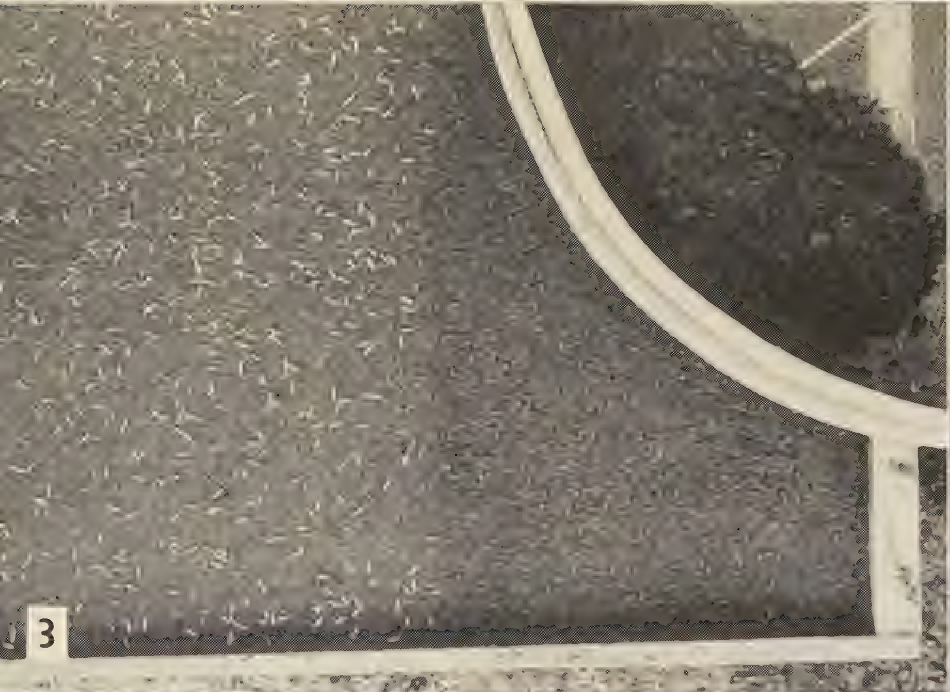
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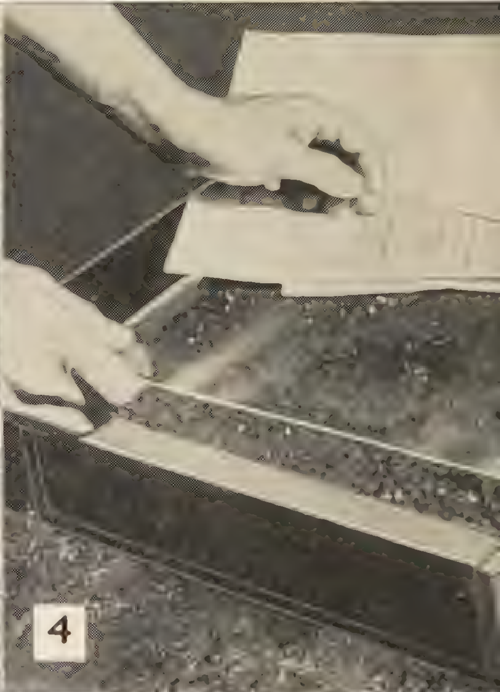
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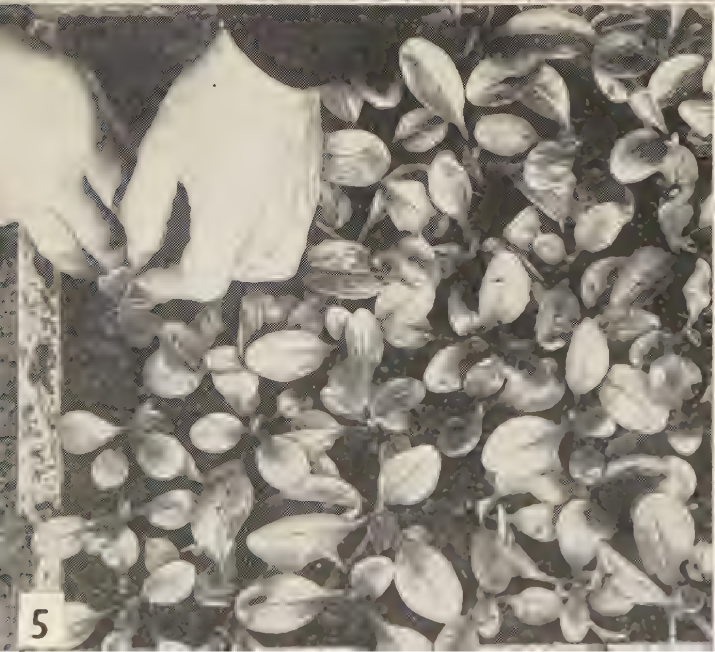
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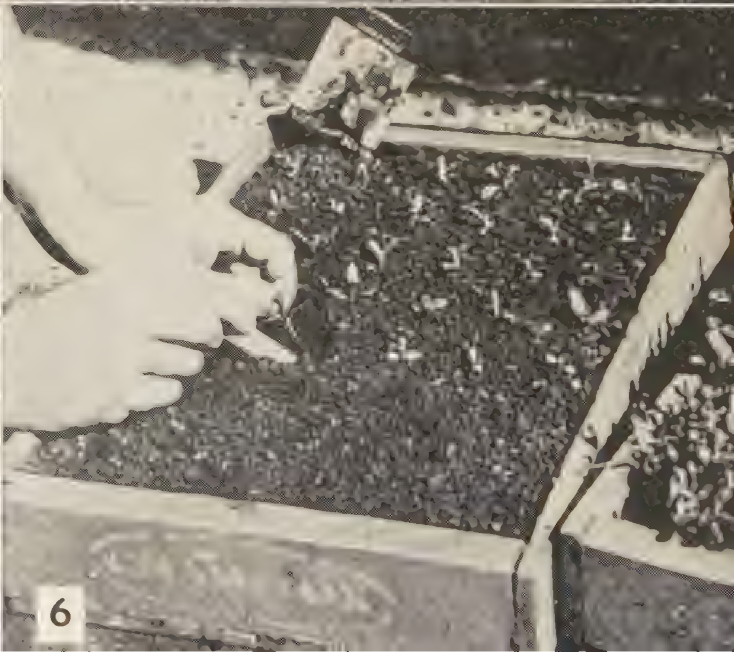
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Plants which are sown where they are to flower should ultimately appear to be rather informally set out. Though this can be achieved by sowing the seed broadcast over the whole area, it is much easier to sow the seed in drills. The plants can be weeded, thinned out, and hoed when young, while if broadcast, much more hand work is required among the plants. To achieve an informal effect finally seedlings should be thinned out from the drills at slightly irregular intervals so that when they grow up they will not appear to be in strict lines.

2. Sowing Seeds in Frames or Raised Beds

Seeds are sown in frames or raised beds when the plants require transplanting to their final flowering positions. The soil in the frame should be open and well drained, as it will probably require watering before the plants are finally removed. Soil can be improved by the addition of sifted compost, leaf mould, or peat, and if necessary coarse sand or scoria. It is an advantage if the frame can be covered with glass lights in spring to maintain warmth and moisture and scrim in summer to provide shade to the seed or seedlings.

If no frame is available, seeds can be sown in the same manner in an area in the open kept specially for this purpose. In spring this portion should be facing north to obtain the maximum sunshine and warmth, and protected from strong winds which would dry the soil too much. If seed is to be sown in summer, the area should be shaded from the midday or afternoon sun. The soil should be improved to the ideal physical condition, as many garden soils are not open enough to withstand the frequent waterings required by young seedlings.

ILLUSTRATIONS OPPOSITE

1. The box is prepared by placing coarse material in the bottom for drainage. The box is then filled with sifted soil to the upper edge.
2. The soil is made firm and level by pressing with a flat board.
3. Seed is thinly and evenly sown over the surface and covered with a thin layer of soil sifted through a $\frac{1}{8}$ in. sieve.
4. The box is then covered with a sheet of glass and paper to retain moisture and reduce the light.

[*Sparrow*

5. When ready for pricking out seedlings are held by the leaves and the roots eased from the box with the fingers, plant label, or dibble.
6. When seedlings are pricked out a hole is made in the soil, the plant is then suspended in the hole, and the soil pressed round the roots. The box is watered and stood in a shaded place for two or three days until the plants are established.

[*Sparrow*

3. Raising Plants in Pots and Boxes

Though commercial producers raise the majority of their plants in pots or boxes, the home gardener need do this only with plants raised from very small seeds or with plants which require extra warmth or care in their early stages of growth, or are very slow to germinate.

The preparation and sowing of seeds in boxes is shown in illustrations on the opposite page.

The choice of the soil mixture is important, as more watering will be required than with seeds sown outdoors. Many seed shops and nurserymen sell prepared soil mixtures suitable for this purpose, but if the gardener wishes to make his own, the most satisfactory mixture is that known as the John Innes seed mixture made up from:

2 parts (by volume) of good garden loam (soil containing rotted turf or old grass roots is very suitable)

1 part (by volume) of leaf mould, compost, or peat

1 part (by volume) of coarse river sand, pumice, scoria, or perlite

To each bushel of mixture add $\frac{3}{4}$ oz of lime and $1\frac{1}{2}$ oz of superphosphate (an apple case contains about 1 bushel)

The loam and compost should be sieved through a $\frac{1}{4}$ in. sieve and all materials should be well mixed. The best method is to place the materials in layers in a heap and then turn the heap several times. When the seed box is filled with soil which has been firmed and levelled, the seed should be sown thinly on the surface. It is then covered with a thin layer of soil or sand, sifted through an $\frac{1}{8}$ in. sieve.

If the seed is very fine, it may be desirable to sprinkle a thin layer of sifted sphagnum moss on the surface of the soil and sow the seed on this. It is important that the soil in the box should be quite moist after the seed is sown. This is best done by placing the box in a bath containing water not quite as deep as the height of the box. When the surface soil is thoroughly moist the box should be removed and allowed to drain and then covered with a sheet of glass and paper or a piece of asbestos sheet the same size as the box. This method of watering a box is much more satisfactory than using a watering can, as with the can the seeds are washed over the surface.

In the early part of the year the box should be placed in a warm position in a glasshouse or glass covered frame or even by a sunny window in the house. The glass should be lifted and turned each day, and as soon as the seeds germinate the paper should be removed and the glass lifted slightly and removed gradually. Preferably for the first day or two the box should be taken from the direct sunlight so that the seedlings may harden off gradually. If the seedlings show any tendency to damp off, they should be watered with captan at 1 oz to 3 gallons of water. This material will also control moss or algae on the soil surface.

Later in the year when seeds are sown in boxes these can be stood outside preferably in a partially shaded position and protected from strong winds. Some care will be needed when the glass is first removed from the seedlings and special care should be taken that the boxes do not dry out at this stage. Many of the cheaper watering cans have coarse roses and a specially fine rose should be selected for watering the seedlings.

Transplanting

Seedlings should be transplanted as soon as they can be handled, as, unless sown very thinly, they will become crowded and compete with each other. The soil mixture in the box can be the same as that for seed sowing, with the addition of $1\frac{1}{2}$ oz of blood and bone to the bushel of mixture. Before transplanting, the soil in the seed box should be reasonably moist so that the seedlings can be lifted with the minimum of disturbance and with soil retained by the roots.

Groups of seedlings should be lifted with a small round stick (dibble) or flat plant label. From there the best plants should be selected and set out at an even spacing in the box of fresh soil. Seedlings should always be handled by the leaves and never by the stem. In transplanting a hole is made with a small dibble, the seedling is suspended in the hole, and the soil gently firmed round the roots but not the stem.

When a box is completed it should be lightly tapped to bring the soil level and then watered with a fine-rose watering can. The plants should be placed in a shady place for two or three days until they have rooted into their new soil and if placed outside should be lightly watered two or three times a day until established.

If the seedlings have been grown in a glasshouse or frame, they should be hardened off for two or three days before they are set out in the open. This can be done by placing the boxes in an open sheltered position in the garden, protecting the plants from too much sun or wind. The evening before planting out, boxes should be well watered and the plants set out the

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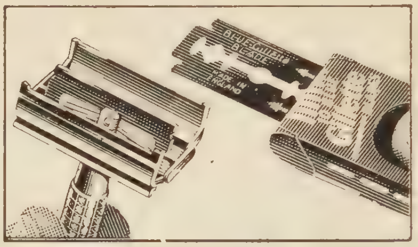

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following day and again watered in, even if the soil is moist. They will require watering again for two or three days unless the weather is wet.

Special Treatment of Seeds

Certain seeds require special treatment to germinate satisfactorily. Hard-coated seeds of the pea family (leguminosae) germinate better if treated with hot water before sowing. The seed is placed in a small container, almost boiling water is poured over it, and allowed to cool. The water is drained off and the seed should be sown as soon as possible. This method is used for seed of shrubby plants such as acacias, tree lucerne, kowhai, etc.

Sweet pea seed should not be treated in this way, but the hard black seeds should be nicked with a knife or scratched with a file before sowing.

Seeds of some trees and shrubs from areas which experience a severe winter require special cold treatment before they will germinate satisfactorily. The simplest method is to put seed in a plastic bag containing a small quantity of damp moss. After the bag is closed it should be placed in a refrigerator for a month. If this practice is carried out in late winter, the seed may be sown outdoors and will germinate satisfactorily in spring.

Garden Work in September

As the ground dries preparation for sowing and planting should continue as described in last month's notes. If the soil is poor, a balanced fertiliser mixture, which can be purchased ready mixed, can be applied at 4 oz to the square yard. Alternatively, a mixture consisting of 3 parts of superphosphate, 1 part of sulphate of ammonia, and 1 part of sulphate of potash can be mixed at home. The fertiliser should be worked into the surface soil, preferably at least two weeks before sowing or planting, to avoid any scorching effect on the young roots.

By JOY WATKINS
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Weed Control

Every effort should be made to clear the garden of weeds before much growth is made in spring. Paths, especially if they are of earth or gravel, should be watered with a weedkiller (such as the proprietary non-inflammable type of sodium chlorate called "Atlacide" at 1 lb in 1 gallon of water to 10 sq. yd.). Such weedkillers should not be used near the roots of desirable trees and shrubs. Do not spray within a yard of the drip line of the branches.

Onion weed, convolvulus, and honeysuckle are weeds which should be controlled as soon as they begin to grow vigorously in spring. None of them is easy to eradicate, and applications of weedkiller often have to be repeated.

Onion weed should be sprayed, when the new leaves are 3 to 6 in. high, with 1 part by volume of an oil-based ester of 2,4-D in 20 parts of diesel fuel. This solvent is used in preference to water, as it is more likely to penetrate the shiny surface of the onion leaf. Onion weed is more resistant to this weedkiller when in flower.

Convolvulus (bindweed) can be destroyed by spraying a water-soluble 2,4-D preparation on to the leaves and stems. If convolvulus is growing in a hedge or among shrubs, the only method of killing it is to dip the growing tips in a small quantity of the diluted weedkiller in a bowl. The weedkiller is absorbed by the tips and travels down the stem to the roots.

Honeysuckle should be sprayed with the brush killer 2,4,5-T (at about 1 pint in 10 gallons of water) when it is just starting to flower. Stems and leaves must be thoroughly drenched, as any unsprayed portions will recover.

Hormone sprays must be used with great care to avoid damage to many useful and ornamental plants such as tomatoes, vines, and shrubs. Spray on a still day, as spray can drift a considerable distance even on a light breeze. Do not use sprayers or water cans for other purposes afterward, as it is practically impossible to remove all traces of 2,4-D from them and susceptible plants are damaged by minute amounts of hormone weedkillers, even a year afterward.

Shrubberies which have been thoroughly weeded can be sprayed with monuron at 1 oz to 150 sq. yd. The effect will last about six months, after which a further spray should be applied to the soil. The amount of water needed to spread the material at this rate will depend on the method of application. A trial run using water in the watering can or sprayer will determine how much monuron to mix with the water so that it is applied at the correct rate of 1 oz to 150 sq. yd. After spraying the soil should not be disturbed, as more weed seeds will be brought to the surface. Monuron kills germinating seeds, but will not control perennial weeds such as twitch.

Twitch and other grass weeds that have invaded hedges and shrubberies can be eradicated with dalapon. It should be applied to the leaves when the grass is growing vigorously in spring or autumn at ¼ lb per 100 sq. yd. Repeat applications are necessary for grasses with creeping stems such as twitch.

Dalapon should be applied during a spell of fine weather if possible, as rain will wash it into the soil, where it can damage the roots of shrubs or trees. The tops of the grasses will turn brown after treatment, but they should not be removed until about a month later to allow the material to travel down the stems to the roots.

Oxalis patches in vacant areas of the home garden well away from the roots of any desirable trees or shrubs can be treated with vapam. This material, if carefully used at 1 gallon to 200 sq. ft., will kill most growing weeds and weed seeds, though it will not affect dormant corms of oxalis.

When oxalis is growing freely the ground should be thoroughly cultivated to break up any clods and allow the weedkiller to penetrate the soil freely to a depth of at least 6 in. Vapam should then be mixed with a little water in a watering can and applied at the above rate. Water should then be hosed on to the ground to wash the weedkiller into the soil to a depth of 6 in. to reach most of the oxalis corms. Treated areas may be planted two weeks later.

Failure from the use of vapam is usually due to poor preparation of the soil, low rates of application, insufficient penetration of the liquid into the soil, too high or two low soil temperatures (outside the 45 to 70 degrees range at 4 in. depth), or dormancy of the oxalis corms.

Vapam can be used at much lower rates for the control of less resistant weeds.

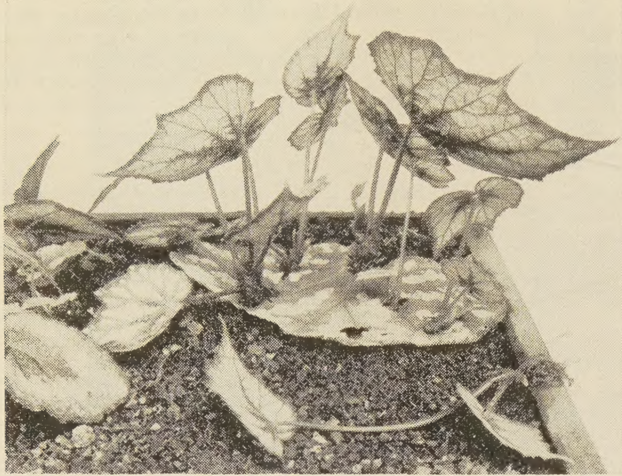
Evergreens

Citrus and many other evergreen trees and shrubs may drop many of their leaves this month, particularly if there is a dry spell. The trees are usually healthy and are merely shedding their old leaves as the buds grow out to form new shoots. For a short time the tree may look sick, with a carpet of old, yellow leaves underneath and little sign of fresh growth, but as soon as there is a good rain and the weather becomes warmer it will be covered in new shoots and leaves. If a balanced fertiliser were applied about a month ago, this will now be available to the plant and the new leaves will be a healthy dark green.

Bulbs

Bulb flowers from new, expensive varieties should be removed as they fade so that the food produced by the

GARDEN WORK FOR SEPTEMBER



[*Sparrow*

Rex begonia leaf cuttings. Any young fully grown leaf will form new plants wherever main veins are slit. Keep them moist and shaded until they have rooted.

leaves is not wasted in the production of unwanted seeds. Bulb shows and displays held this month in many shops provide gardeners with an opportunity to evaluate new varieties and to note those which would be desirable additions to their gardens. It is not too early to place orders now for delivery in autumn.

Banks

Banks, particularly those with rock outcrops, can prove difficult to care for unless carefully prepared and furnished with the various plants which enjoy such positions. In the South Island alpine plants may transform an awkward corner into an outstanding feature of the garden which will look particularly attractive at this time. Further north and in positions which dry out during summer such plants as gazania, arctotis, South African bulbs, and succulent plants can be grown to advantage.

Before a bank is planted every effort should be made to remove weeds, particularly perennials, as it is almost impossible to do this once the ornamental plants are established. Drainage should be improved if necessary, particularly for alpine plants. Banks are not necessarily well drained, as rock or clay formation beneath the topsoil may form pockets which hold water even on steep slopes.

If the bank has been formed during levelling of the site, there may be little topsoil on it. Gazanias appear to thrive under such conditions, but few other plants will flourish unless the topsoil is returned. Wire netting, concrete cribbing, or rocks can be bedded into the bank to reduce soil slip.

Banks with a considerable amount of rock outcrop can be clothed with a mixture of climbers such as bougainvillea and jasmine, which together will be in flower for most of the year. A neater effect can be achieved with self-clinging climbers such as *Ficus minima* or Virginian creeper, which require very little attention.

As the spring-flowering alpines, gazanias, etc., finish flowering, they should be trimmed back hard with shears or a knife so that a compact mass of new shoots is made to provide next season's flowers. Without this attention some plants quickly become very straggly and tend to die.

House Plants

The potting or repotting of house plants as described last month should be completed before they have made too much new growth. Any geranium, balsam *Impatiens hosti*, aluminium plant (*Pilea cadierei*), and similar plants which have become drawn and leggy during winter can now be cut back or trimmed to a better shape. Prune with a sharp knife to sound buds. New growth will rapidly develop from these buds at this time of year and a shapely, leafy plant will be formed.

Many house plants can be propagated during the next few months (as soon as the room or glasshouse temperature can be kept at a minimum of 50 degrees F). Gloxinia, peperomia, many begonias, streptocarpus, and African violet and similar plants, which have thick fleshy leaves, are readily propagated from leaf cuttings.

One or two leaves placed with the stalk in fresh rainwater to which charcoal has been added will gradually produce roots at the base of the leaf or leaf stalk if kept on a warm kitchen shelf in good light but away from direct sunlight. Some, such as peperomia, produce a new plant at the base of the leaf stalk. Rex begonia and others create the new plant at the junction of leaf blade and leaf stalk. Under good conditions this takes about six weeks.

Many plants die because they are transferred to soil before a strong root system is formed. It is advisable to add a sandy soil mixture to the water in the container when roots are developing so that the root system becomes established in soil before plants are potted up.

Leaf cuttings can also be rooted in sand, perlite, or a propagating mixture in the conventional way. Small leaves are inserted whole. Larger leaves can be laid flat and the veins severed, or they can be cut into small pieces each with a portion of the main vein.

Cyclamen

Cyclamen should still be flowering freely. Aphids multiply rapidly on the backs of the leaves and the buds as the weather becomes warmer and should be killed as soon as noticed, as they cause distortion of the leaves and flowers. Nicotine sulphate at 1 fl. oz. in 4 gallons of water or 1 oz of 25 per cent lindane wettable powder in 4 gallons is a suitable spray. It is usually most convenient to take house plants outside for spraying. Small plants may be dipped upside down in a bowl of the diluted spray material; this ensures thorough spray coverage.

As the corm may rot if water remains in the crown of the plant, many home gardeners prefer to water cyclamen from below by standing the pot in water for a short time and then allowing it to drain.

Rotting of the roots occurs occasionally. This can be caused by overwatering or by a root disease. The leaves of affected plants turn yellow and wilt, as the roots are unable to absorb water. Though the plant is wilting, water should not be given, as this will aggravate the trouble. Let the plant dry out a reasonable amount to give it a chance to recover and do not apply any fertiliser until it is growing vigorously again. To combat the root disease, water with ½ oz of captan in 4 gallons of water once a month during the growing season.

Floral Decoration

As more flowers become available it is a pleasure to use them more freely in old-style mass arrangements. Several kinds of flowers may be used effectively in one vase or bowl. Each should be grouped as they would be when growing in the garden rather than dotted singly throughout the arrangement. Groups of the larger, heavier-looking flowers, usually of a darker colour, will give a focal point, while delicate tapering spikes in lighter colours provide height and width.

Cyclamen flowers should be carefully pulled from plants rather than cut, as the base of the flower stalk is naturally constricted and will leave only a tiny wound. If the flowering stalk is cut, it may rot owing to the entry of disease and this rotting can affect the entire corm. Before flowers are arranged, the bases of the flower stalks should be cut to facilitate entry of water.

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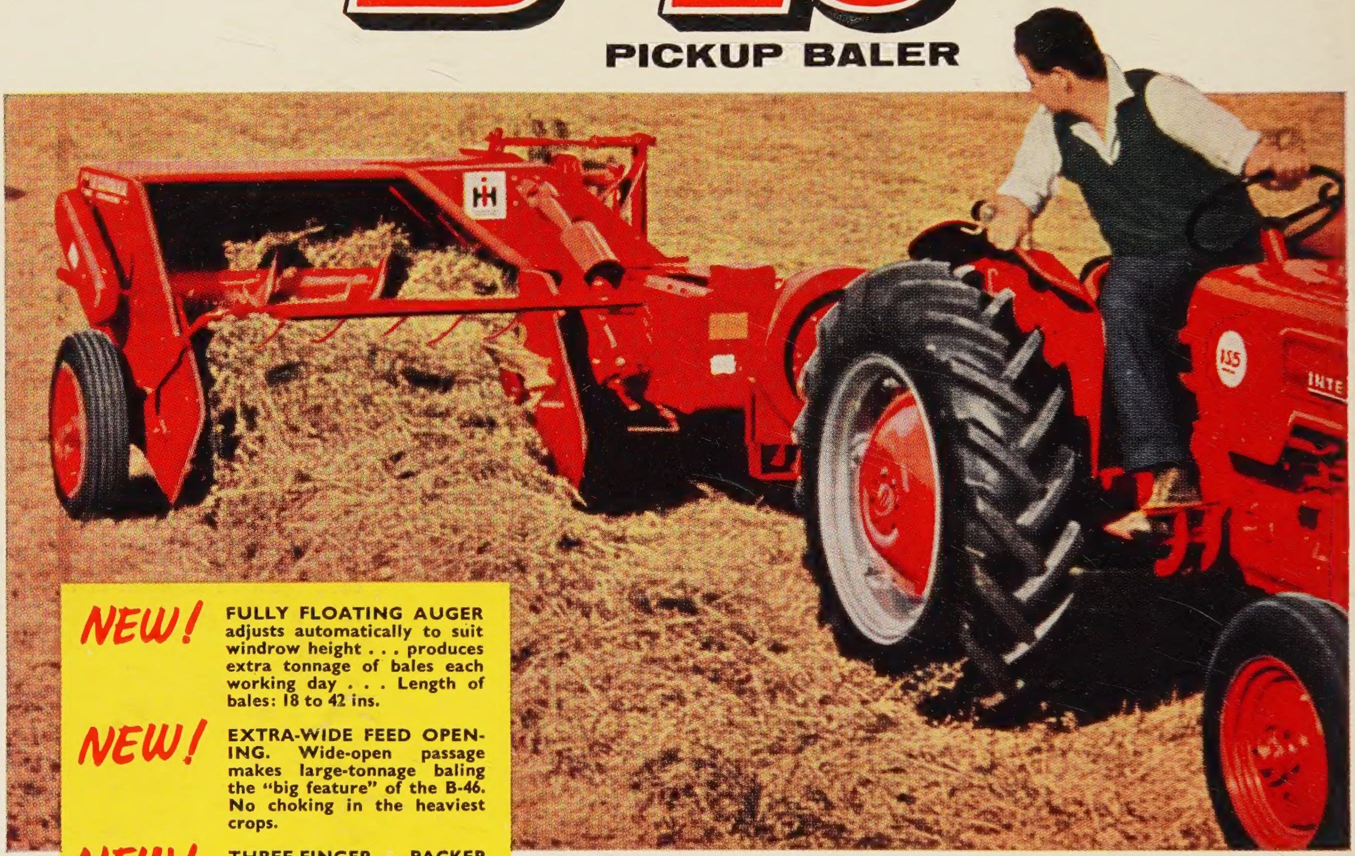

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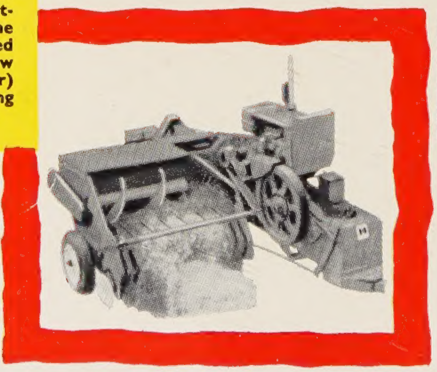

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